ILTA
Since 1950

JILTA

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Synopsis of Objectives

- An Association with over 550 members from India and abroad working since last 72 years for the growth and development of Leather and its allied industries.
- Organize seminars, symposiums, workshops in order to share information, knowledge & latest development and interactions for the benefit of all concerned.
- Organize Human Resource Development programmes on regular basis.
- Publish for over 72 years, a technical monthly journal namely "Journal of Indian Leather Technologists' Association" (JILTA), widely circulated through out the World.
- Publish books for the benefit of the students at various levels of study, for the Research Scholar and the Industry.
- Work as interface between Industry and the Government.
- Assist Planning Commission, various Government Institutions, Ministry and autonomous bodies to formulate appropriate policies for the growth of the Industry.
- Assist small and tiny leather goods manufacturers in marketing their products by organizing LEXPOs in Kolkata and different parts of India.

ILTA
Since 1950

Indian Leather Technologists' Association
[A Member Society of International Union of Leather Technologists' and Chemists Societies]

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JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

Indian Leather Technologists' Association is a premier organisation of its kind in India was established in 1950 by Late Prof. B.M.Das. It is a Member Society of International Union of Leather Technologists & Chemists Societies (IULTCS).

The Journal of Indian Leather Technologists' Association (JILTA) is a monthly publication which encapsulates latest state of the art in processing technology of leather and its products, commerce and economics, research & development, news & views of the industry etc. It reaches to the Leather / Footwear Technologists and the decision makers all over the country and overseas.

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(Member Society of International Union of Leather Technologists and Chemists Societies)

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JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

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Climate Change - A Serious Concern For India

Climate change may induce global warming by the end of the century, potentially causing heart attacks and heat strokes in densely populated regions worldwide, such as India and the Indus Valley. Interdisciplinary research from Penn State College of Health and Human Development, Purdue University College of Sciences and Purdue Institute for a Sustainable Future — published in the "Proceedings of the National Academy of Sciences" — indicated that warming of the planet beyond 1.5 degrees Celsius above pre-industrial levels will be devastating for human health. Human bodies, according to the research, can take only certain combinations of heat and humidity before experiencing heat-related health problems, such as heat stroke or heart attack. The research suggests that a rise of 2 degrees Celsius above pre-industrial temperatures could result in intolerable heat for a significant population. Approximately 2.2 billion individuals in Pakistan and India's Indus River Valley, 1 billion in eastern China, and 800 million in sub-Saharan Africa would be exposed to prolonged periods of extreme heat.

The cities that would bear the brunt of this annual heat wave will include Delhi, Kolkata, Shanghai, Multan, Nanjing and Wuhan as these areas comprise low and middle-income nations, hence, people, in these cities, may not have access to air-conditioners or other effective ways of cooling their bodies.

If the planet's global warming persists at 3 degrees Celsius above pre-industrial levels, the spiked heat could impact the Eastern Seaboard and the central region of the United States, spanning from Florida to New York and from Houston to Chicago. The research also indicates that South America and Australia would also experience extreme heat in such a scenario. The research further stressed that people in developed nations would suffer less than the developing nations, where the old and the ailing may die. "The worst heat stress will occur in regions that are not wealthy and that are expected to experience rapid population growth in the coming decades," said the research paper's co-author Matthew Huber, Professor of Earth, Atmospheric and Planetary Sciences at Purdue University.

"This is true despite the fact that these nations generate far fewer greenhouse gas emissions than wealthy nations. As a result, billions of poor people will suffer, and many could die. But wealthy nations will suffer from this heat as well, and in this interconnected world, everyone can expect to be negatively affected in some way," he added. The researchers said that in order to stop temperatures from increasing, the emission of greenhouse gases, especially the carbon dioxide emitted by burning fossil fuels, must be reduced. If changes are not made middle-income and low-income countries will suffer the most.

India will bear a higher brunt of climate change than its peers, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) said, as it pointed out that the Asia-Pacific region had fallen further behind in financing climate action. In a report released on Friday, ESCAP noted that losses from climate change due to high emissions could be higher at 35% of the gross domestic product for India compared with 24% of the GDP for developing Asia by 2100, and average losses for Asia-Pacific economies from disaster-related and other natural hazards could double to $1.4 trillion in the worst case scenario during this period.

"Inaction is no longer an option. All stakeholders must commit to accelerate change by transforming their financing priorities, processes and programmes in order to meet the Sustainable Development Goals and climate action ambitions," said Hamza Ali Malik, director of the macroeconomic policy and financing for development division, ESCAP. The report comes at a time

when global agencies have been highlighting that developing countries are not on track to meet their Sustainable Development Goals by 2030. The ESCAP report pointed out that Asia-Pacific has regressed on climate action since 2015, with most countries yet to convert their carbon neutrality commitments into law. Out of the 39 countries in the region, only five have adopted a law on carbon neutrality. The report highlighted 10 action points that the countries needed to address to bridge the sustainable financing gap, which included solutions like local currency financing, private sector participation, net zero goals, regulatory action and policy coherence. India needs $1.04 trillion of funding for mitigation and adaptation under nationally determined contributions till 2030.

Satellite measurements over Antarctica have detected a giant hole in the ozone layer.

The hole, which scientists call an "ozone depleted area" was 26 million square kilometres (10 million square miles) large. This is roughly three times the size of Brazil. The European Space Agency (ESA) Copernicus Sentinal-5P satellite made the recordings on September 16 2023 as part of the environmental monitoring program of EU. Claus Zehner, ESA's mission manager for Copernicus Sentinal-5P, told DW that this is one of the biggest ozone holes they've ever seen. "The satellite measured trace gases in the atmosphere in order to monitor the ozone and climate. It showed that this year's ozone hole started earlier than usual, and had a big extension," said Zehner.

Experts believe the hole in the ozone is not likely to increase warming on the surface of Antarctica. "It's not a concern for climate change," said Zehner. The ozone layer is a trace gas in the stratosphere, one of the four layers of the earth's atmosphere. It functions as a protective gas shield that absorbs ultraviolet (UV) radiation, protecting humans and ecosystems from dangerous amounts of UV. Most skin cancers are caused by exposure to high amounts of UV radiation, so anything that shields us from UV rays helps reduce cancer rates. The size of the ozone hole over Antarctica fluctuates each year, opening each year in August, then closing again in November or December. Zehner said the ozone hole opens up because of the rotation of the Earth causing specials winds over the closed landmass of Antarctica. "The winds create a mini climate, creating a shield over Antarctica preventing it from mixing with air surrounding. When the winds die down, the hole closes," he said. Scientists believe this year's big ozone hole could be due to the volcanic eruptions at Hunga Tonga in Tonga during December 2022 and January 2023. "Under normal conditions, gas released from a volcanic eruption stays below the level of the stratosphere, but this eruption sent a lot of water vapor into the stratosphere," said Zehner. The water impacted the ozone layer through chemical reactions and changed its heating rate. The water vapor also contained other things that can deplete ozone like bromine and iodine.

"There is not much evidence the ozone hole is due to humans," Zehner said. While this year's Antarctic ozone hole was likely due to a volcanic eruption, scientists became aware that human activities were creating huge ozone holes in the 1970s.

Ground and satellite-based measurements detected the man-made holes, which were caused by widespread use of chemicals called chlorofluorocarbons (CFCs). "The culprit behind ozone depletion was not aerosols in aerosol cans, but the propellants we use as gases to propel the solutions inside. These gaseous propellants contain chlorine, which is released high in the stratosphere and depletes the ozone," said Jim Harwood, a professor of atmospheric science at University of Exeter, UK. The world took action after scientists raised alarm over the ozone holes, and quickly. In 1987,The Montreal Protocol was created to protect the ozone layer by phasing out the production of these harmful substances.

The good news is that the protocol was effective — ozone holes got smaller in the decades after ozone-depleting gas emissions were controlled. Scientists agree that ozone depletion is not a principal cause of global climate change. However, Harwood said there are signs that rising global temperatures could be impacting ozone holes. "Our mitigation of the ozone hole was working well since the 1980s, but in 2020 we were taken by surprise when the 2020 ozone hole was very deep and long lasting," Harwood told DW. The same was true for 2021.

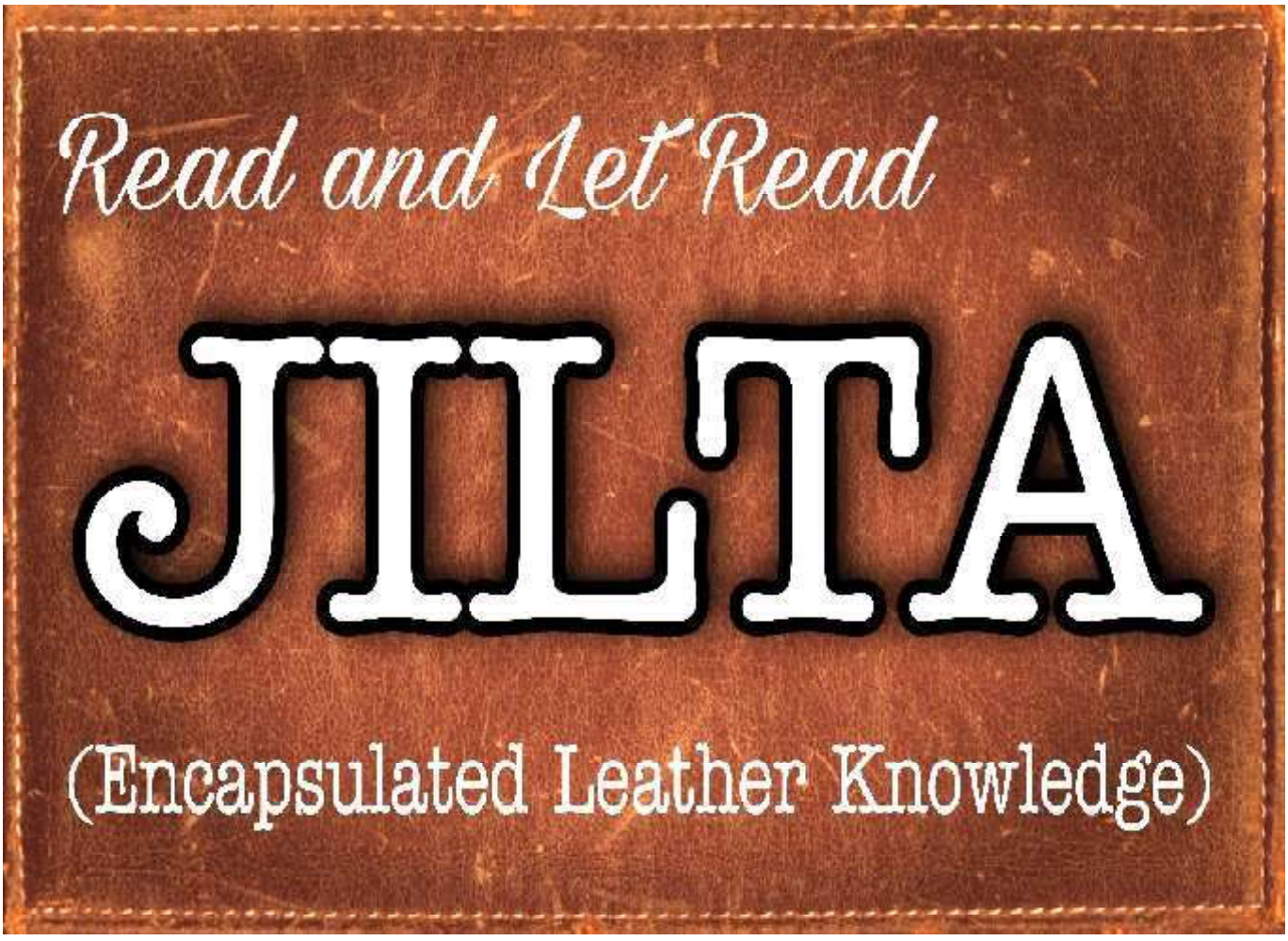
Research showed that the main reason for the large ozone hole in 2020 was due to the wildfires in south eastern Australia that year. Harwood said that as the climate crisis carries on, with the Earth continuing to warm, fires are getting more common and more devastating around the globe. "It has been an amazing bad year for boreal fires in the northern hemisphere this year. If that continues to happen, we get more smoke injected into the stratosphere, and we might get more ozone depletion coming back," said Harwood.

It is less clear what impact ozone holes have on the earth's climate. Some data shows that ozone holes actually contribute to cooling effects, as they reduce the greenhouse gas effect. But Harwood said there is evidence ozone holes changes the progression of the seasons. "If you get ozone depletion, it takes longer for the hole to repair. This means you have a longer, more drawn-out polar vortex, so you'll have wintertime lasting that little bit longer," he said.

Therefore, climate concern is the biggest concern of the world and we have to concentrate on it rather than getting engaged in regional wars. Otherwise, climate change will cause a massive unavoidable global war.

Goutam Mukherjee

Dr. Goutam Mukherjee
Hony. Editor, JILTA




GREEN
TECHNOLOGY
the power to heal our future
INSPIRING GREEN TECHNOLOGY

As an active proponent of responsible chemistry, Stahl has established the Stahl Campus® training institute in its Center of Excellence for sustainable leather technologies in Kanpur. With our Stahl Campus® Leather Modules, we can offer training and information, such as responsible chemistry and sustainability in leather production. We believe that in this way, we facilitate transparency that inevitably will lead to a better supply chain with responsible chemistry.

Our approach is modular, making it easy to tailor learning programs to specific needs. Stahl Campus® has at its core the drive to unlock human potential and make that new competitive advantage. By providing the possibility of sharing knowledge, we embrace our role in the dynamic leather and chemical industry. Stahl Campus® is a great opportunity to strengthen skills and capabilities in order to make working methods more efficient by sharing experiences and studying products and procedures.

If you're interested to receive more information on Stahl Campus®, please contact Prasanna Maduri (**Prasanna.maduri@stahl.com**).

If it can be imagined, it can be created.


stahl
We imagine sustainable pickle-free leather tanning
If it can be imagined, it can be created.
Tanners benefit from higher process efficiency, reduced water, chemical and salt consumption and a reduced environmental impact. This makes it possible for tanners to have an efficient process that is also sustainable and yields eco-friendly premium leathers.
High-quality leather no longer forces a choice between responsible processes and efficiency. The main benefits of a pickle-free system that avoids salt addition during pickling are:
▪ Reduction of water consumption by up to 40%
▪ Shorter process time on cow, sheep and goat
▪ Cleaner effluent, TDS reduction by up to 40%

STAHL SECURES ISCC PLUS RE-CERTIFICATION FOR FACILITIES IN GERMANY AND THE NETHERLANDS

Stahl, a leading provider of coating technologies, announces the successful re-certification of two manufacturing sites, in Germany and the Netherlands, according to the ISCC PLUS standard. The re-certification of the sites by certifying body TÜV NORD means Stahl can continue to scale up its use of renewable feedstocks across its polyurethane portfolio and beyond. This will enable the company to offer customers more products containing attributed renewable raw materials. The development marks a key step forward in Stahl's supply chain transparency ambitions, targeting greenhouse gas (GHG) emission reductions across the value chain. The ISCC PLUS-certified products manufactured at Stahl's Waalwijk and Leinfelden locations include selected polyurethane coatings for flexible materials such as textiles, film and paper. The polyurethanes are made with between 20% and 70% renewable attributed biomass and recycled content. These products have the same performance as traditional fossil-based alternatives.

Renewable content is measured and verified using the mass balance methodology. This is a calculation-based approach that tracks the flow of materials through complex supply chains. Mass balance-certified products, such as those adhering to the ISCC PLUS standard, typically contain a mix of renewable- and non-renewable-derived feedstocks. The mass balance principle ensures that the percentage of renewable feedstocks always remains consistent, from sourcing to finished product.

Michael Costello, Group Director of ESG at Stahl:fl *"Mass-balance certification verifies that Stahl's manufacturing sites adhere to the highest standards of traceability, which is required to produce high-performing products containing both fossil- and renewable-derived feedstocks. Certification also requires a transparent chain of custody for the renewable raw materials used by the reporting company. This is essential to mitigate potential upstream supply chain risks, making ISCC PLUS certification a key tool for promoting greater supply chain transparency across the industry."fl*

Lidia Martínez, ESG Supply Chain Transparency Manager at Stahl:fl *"We are pleased to offer customers more mass balance-certified products made with ISCC PLUS-certified raw materials. Thanks to our re-certification, we can keep expanding our range of mass balance-certified polyurethanes made with bio-based, bio-circular and circular raw materials. ISCC PLUS re-certifications are an assurance of the quality and transparency of Stahl's mass balance bookkeeping. Alignment with ISCC PLUS is one of the ways we support the responsible sourcing of renewable feedstocks by providing proof of traceability."*

About ISCC PLUS

ISCC – International Sustainability and Carbon Certification – is a certification system that offers solutions for the implementation and certification of sustainable, deforestation-free and traceable supply chains for a wide range of bio-based and circular materials. These include biomass waste and residues, non-biological renewables and recycled

carbon materials. Independent third-party certification ensures compliance with high standards of ecological and social sustainability, as well as traceability, throughout the supply chain. All ISCC PLUS certificates are publicly available via the ISCC PLUS portal.

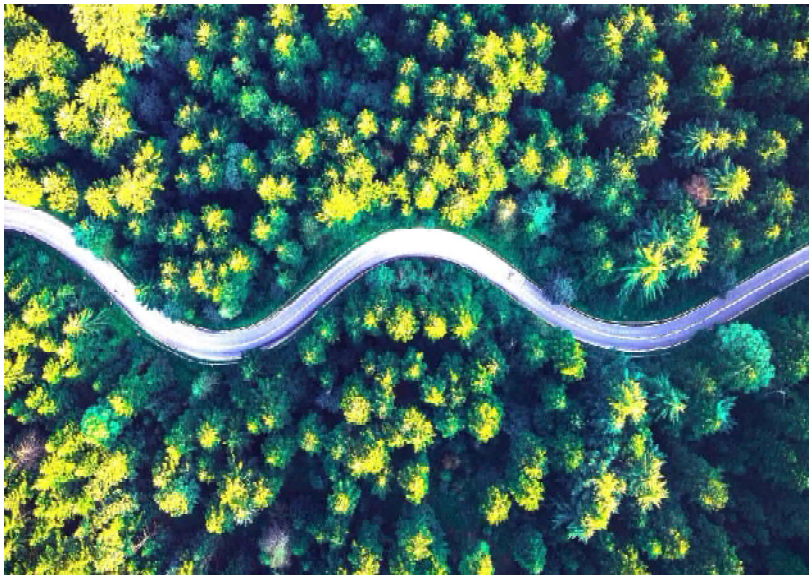
About TÜV NORD

A leading certifying body with more than 1,200 expert auditors all over the world, TÜV NORD provides professional audit and certification services across a range of industries, from aerospace to food service. TÜV NORD has been Stahl's certification partner since 2022 when it certified compliance with the ISCC PLUS standard at Stahl's Waalwijk and Leinfelden sites.

(Stahl News – 18/07/2023)

STAHL DEMONSTRATES PROGRESS ON ESG AMBITIONS WITH SECOND CONSECUTIVE PLATINUM ECOVADIS RATING

Stahl, a leading provider of coating technologies for flexible substrates, has been awarded a Platinum rating by the sustainability rating agency EcoVadis for the second consecutive year. For the 2023 EcoVadis assessment, Stahl's rating increased by three points compared to its 2022 score, reflecting the company's improved performance in the area of labour and human rights.



EcoVadis is a globally recognised, evidence-based rating platform that assesses the performance of more than 75,000 organisations against key sustainability criteria across four categories: Environment, Labour & Human Rights, Ethics and Sustainable Procurement.

For the 2023 EcoVadis assessment, Stahl received an overall score of 80 out of 100, up from 77 in 2022. This score indicates an advanced level of sustainability maturity and ensures that Stahl retains its Platinum rating. This is awarded to the top 1% of companies assessed by EcoVadis. Stahl achieved its first Platinum rating in 2022, having undergone its first EcoVadis assessment in 2015.

Ingrid Weijer, ESG Performance Manager at Stahl:fl *"We are proud to have maintained our Platinum EcoVadis rating for the second year in a row. This score reflects Stahl's flongoing commitment to transparency and the new policies and initiatives that were introduced over the past 12 months. But we are not perfect, and the EcoVadis evaluation criteria are becoming more demanding, so we will continue to work to improve our performance into next year."*

Progress in the Labour & Human Rights category

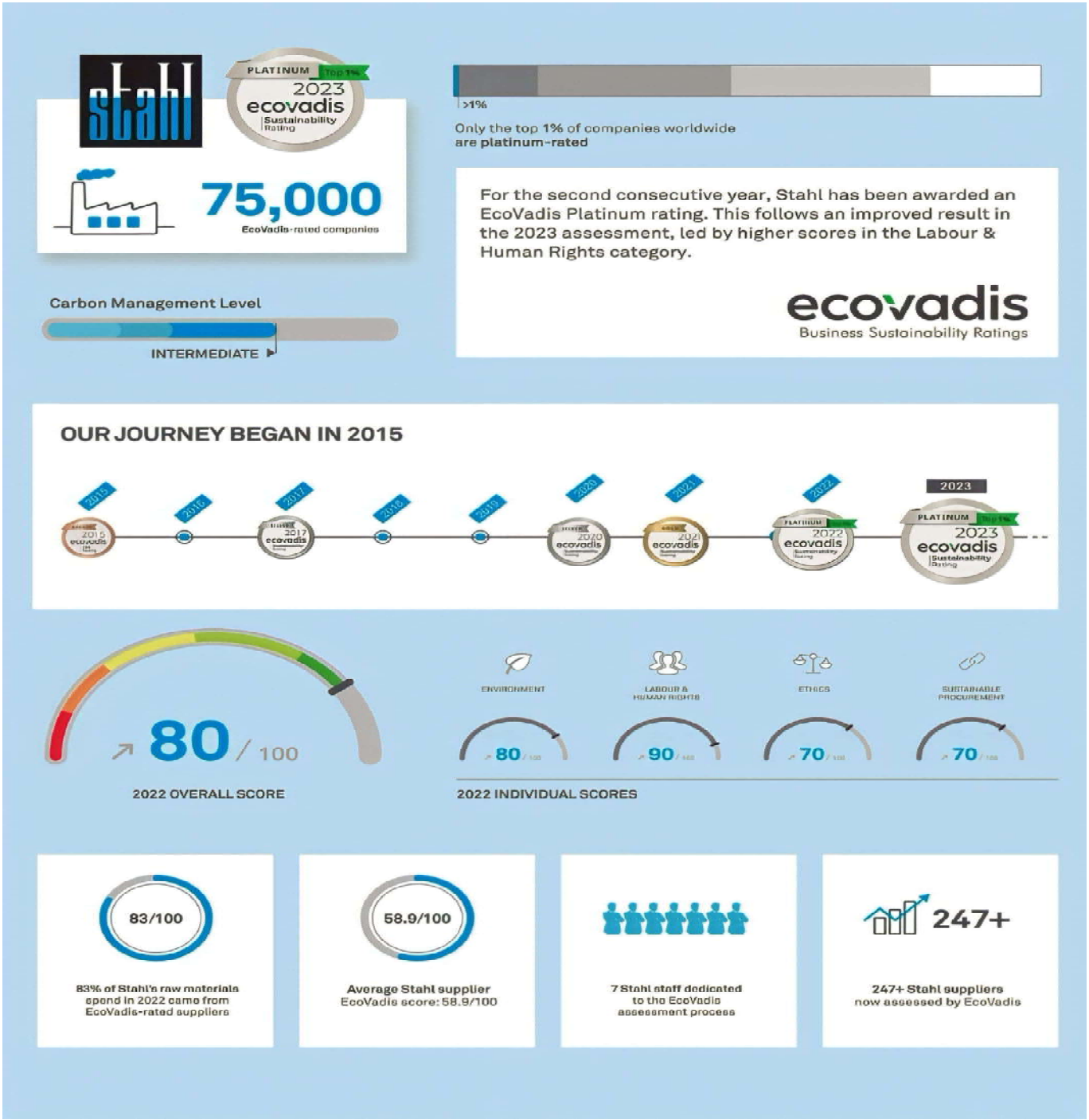
The 2023 EcoVadis assessment revealed the progress Stahl is making in the Labour & Human Rights category, where Stahl scored 90 out of a possible 100 points.This reflects the company's recent work to improve its health and safety management systems. In particular, the majority of Stahl's global manufacturing sites are now ISO 45001 certified and

more than 94% are ISO 14001 certified. Stahl has also taken steps to improve its approach to employee career development and well-being. These include the creation of an individual career plan for all employees and the introduction of a new company-wide employee satisfaction survey.

Stahl moves forward with 2030 ESG ambitions

Stahl has set a 2030 target to maintain its EcoVadis Platinum rating by working closely with its value chain partners to help them reduce their impact. Infl2022, 83% offlStahl's total spend on raw materials was sourced from EcoVadis-rated suppliers.

(Stahl News – 19/09/2023)



RESPONSIBLE CHEMISTRY INVOLVES RETHINKING PRIORITIES

Stahl's road to responsible chemistry started in 1978 with the launch of our first water-based leather finishing product. Since then, and over the last 20 years in particular, we have defined Responsible Chemistry and ushered it into our industry. Using our expertise to improve the performance of existing materials and productionize breakout ones, like fruit textiles, for example, that are even more sustainable. But we recognize there are more opportunities to do more. And that starts with our supply chain and the journey our products undergo from raw material to end of life.

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Our vision on responsible chemistry

As a company, we are actively trying to replace petrochemicals with renewable resources. But our road to responsible chemistry doesn't end there. From a sustainability viewpoint, it is equally important to look at what happens when the products we help to make reach the end of their respective roads. We focus on three priorities to improve our environmental footprint and that of our customers:

1. Usingfllow-impact manufacturing chemicals
2. Usingflbiotechnologyflto replace non-renewable resources
3. Using waste and recycled content contributing toflcircularity

Using theflLife Cycle Assessment methodology, we measure the impact of a product on the environment over the course of its life.

(https://www.stahl.com/responsible-chemistry/vision)

From the desk of General Secretary

SANJOY SEN MEMORIAL LECTURE

The 22nd Sanjoy Sen Memorial Lecture will be organized by our Association in January, 2024 as usual. As 14th January' 2024 will be a Sunday, the re-schduled date will be announced as soon as possible.

Update and progress will be shared in due course.

5th PROF. S. S. DUTTA MEMORIAL LECTURE

The 5th Prof. S. S. Dutta Memorial Lecture will be organized by the Southern Regional Committee of ILTA on 2nd February, 2024 at Chennai Trade Centre during India International Leather Fair - 2024, like previous years.

Update and progress will be shared in due course.

14th ASIA INTERNATIONAL CONFERENCE ON LEATHER SCIENCE & TECHNOLOGY (AICLST)

ILTA is on the way to organize the 14th Asia International Conference on Leather Science & Technology (AICLST) in the year 2026 at Kolkata, India as endorsed by the IULTCS Secretariat.

It is proposed that this would be organized during the Platinum Jubilee Celebration year of ILTA from August, 2025 to July, 2026, preferably nearer the time of Chennai Trade Fair in February, 2026.

Planning & Details of the program will be shared in due course.

(Susanta Mallick)
General Secretary

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We have started to post Printed copy of JILTA from April' 2022 to members and all concerned as it was before Covid period. Simultaneously we have been sending the e-copy of JILTA through email also to all the concerned receivers.

If you are not receiving JILTA by Post or through email, may please verify your Postal Address and/or Email Id with our office at the earliest.

PUBLISH YOUR TECHNICAL ARTICLE

Faculties, Research Scholars and students of various Leather Institutes may wish to publish their Research / Project papers in an Article form in this monthly technical journal, JILTA.

Interested author may sent their paper (in MS Word format) along with a PP Photograph and Contact details like Email, Mobile etc. to our email IDs : admin@iltaonleather.org / jiltaeditor@gmail.com

Members are requested to :-

a) Kindly inform us your '**E-Mail ID**', '**Mobile No**', '**Land Line No**', through E-Mail ID: admin@iltaonleather.org or over Telephone Nos. : 24413429 / 3459. This will help us to communicate you directly without help of any outsiders like Postal Department / Courier etc.

b) Kindly mention your **Membership No.** (If any) against your each and every communication, so that we can locate you easily in our record.

YOUTUBE CHANNEL & FACEBOOK PAGE OF ILTA

An official **YouTube Channel** namely **ILTA Online** and a **Face Book Page** namely **Indian Leather Technologists' Association** has been launched for sharing the activities of our Association since November' 2020 and July' 2021 respectively.

You may find all the Lives / Video recordings of different Seminar, Symposiums & Webinars on both of these social medias along with our website **www.iltaonleather.org** time to time.

You are requested to kindly do **Like** & **Subscribe** the YouTube Channel and **''Follow**' the FaceBook Page to get regular updates on the activities of our Association.

General Secretary and the Members of the Executive Committee are available to interact with members at 18.30 hrs, at our Registered Office on every Thursday

Solidaridad

With over 50 years of experience in developing sustainable solutions to make communities more resilient, Solidaridad has been working on many different issues, from supporting marginalized communities to fostering a more sustainable supply chain.

Solidaridad

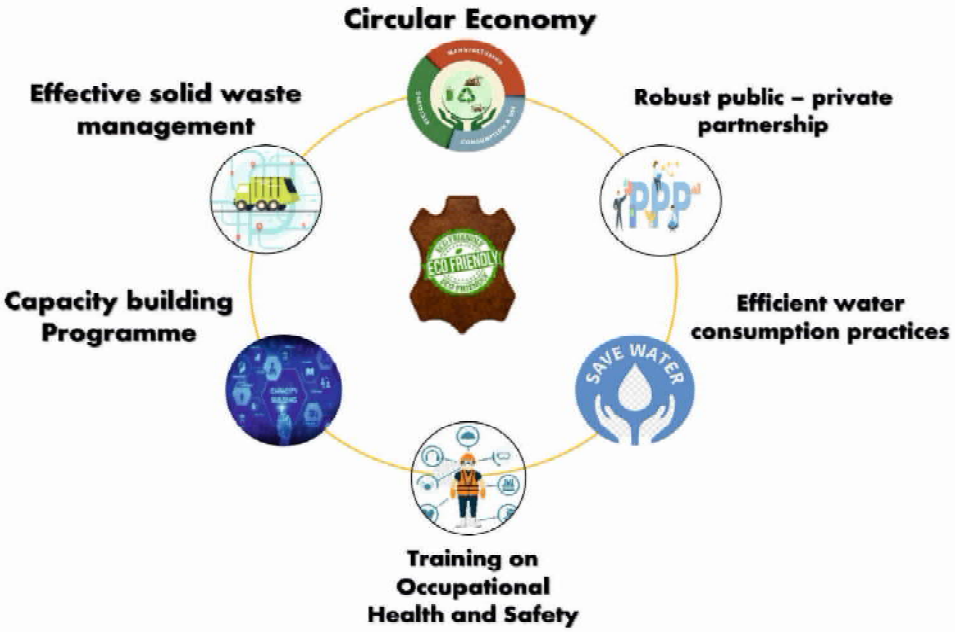
switchasia GRANTS PROGRAMME

Solidaridad

switchasia GRANTS PROGRAMME

EFFECTIVE WASTE MANAGEMENT AND SUSTAINABLE DEVELOPMENT OF MSME TANNING COMPANIES IN KOLKATA LEATHER CLUSTER (BANTALA)

2022-2023



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Solidaridad

switchasia GRANTS PROGRAMME

INTERNATIONAL UNION OF LEATHER TECHNOLOGISTS AND CHEMISTS SOCIETIES
(www.iultcs.org)

The 37th IULTCS Congress held successfully in Chengdu, China

The Global Leather Technology Summit held in great anticipation

After three years of the COVID-19 pandemic, the highly anticipated 37th International Union of Leather Technologists and Chemists Societies (IULTCS) Congress was held from October 17th to 20th, 2023, in Chengdu, China, known as the 'Land of Abundance.' This marked the second time that China had hosted the event since in 1949 (the previous occasion being in Beijing in 2009).

Over 400 participants, including scientists and technologists from 21 countries and regions such as China mainland, China Taiwan, India, Japan, New Zealand, France, Italy, Spain, Germany, Romania, the United Kingdom, the United States, Ethiopia, and others, along with industry professionals, and media representatives, gathered to exchange ideas and research, and discuss the latest research achievements, technological trends, and developments in leather industry.

This Congress received significant attention from the global leather community. The large number of participants, the diverse content of the discussions, the elegant decoration of the venue, and the scientific presentations left a profound impression on all attendees. Both domestic and international delegates praised the meticulous preparations and the quality of the papers presented at this congress.

The congress began with a commemorative short film elaborately prepared by the organizing committee. In the melodious tune of the IULTCS anthem, Prof. Bi Shi from Sichuan University, an academician of the Chinese Academy of Engineering, and the president of the Scientific Committee of the Congress, received the IULTCS flag from Dr. Luis Zugno, the Executive Secretary of IULTCS.

In the opening speech, Yuzhong Li, Vice President of the China National Light Industry Council, Chairman of the China Leather Industry Association, and President of the Organizing Committee of the Congress, pointed out that in the

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current environment where opportunities and challenges coexist, the leather industry must address the contemporary issue of how to achieve industrial modernization through technological innovation and collaboration. Faced with changing consumer preferences and the rapid development of synthetic materials, the global leather industry must seize the key variable of technological innovation and strengthen international cooperation, which is both an objective law of technological innovation and a general trend of the times.

Dr. Joan Carles Castell, the IULTCS Vice President of IULTCS, highlighted the significance of the congress in fostering global cooperation in leather technology. He spoke about the key objectives of the IULTCS, emphasizing the need for sustainable practices and the responsible use of resources within the leather industry. He commended the diverse array of research presented during the congress, showcasing innovations aimed at improving environmental sustainability, product quality, and the industry's competitiveness on the international stage. Dr. Castell extended heartfelt gratitude to the organizers and hosts of this remarkable congress.

Prof. Liangyin Chu, the Vice President of Sichuan University, conveyed his enthusiasm for hosting the 37th IULTCS Congress in Chengdu, China. He underscored the importance of academic institutions like Sichuan University in

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supporting interdisciplinary research and innovation in fields such as leather technology. He spoke about the university's history and dedication to promoting academic excellence and fostering partnerships with industry players.

Innovations to make leather irreplaceable

The IULTCS Congress is renowned in the global leather community as the 'Technological Olympics.' The theme of this year's congress is 'Innovations to Make Leather Irreplaceable,' and it has been elaborated deciphered by over 150 leather technologists around the world.

This Congress featured one 'Heidemann Lecture,' 47 oral presentations, 14 fast oral presentations, and 95 poster presentations, covering eight distinct areas, including advances in leather science basic research, sustainable technologies for leather manufacture, novel strategies in high-efficiency and intelligent leather processing technology, innovations in leather chemicals, and comprehensive utilization of leather wastes.

The 'Heidemann Lecture' for this congress was delivered by Prof. Yujia Xu from Hunter College, City University of New York. Her presentation, titled ' advances in research of collagen-like peptides: from triple helices to fibrils,' offered a comprehensive and in-depth information. This lecture covered the unique structure of collagen proteins and advancements in their applications to the artificial replication of collagen proteins, protein design, genetic engineering, and the future prospects of biomimetic collagen fiber aggregates.

In addition to scientific discussions, the congress provided a platform for sponsor companies in the fields of tanning, leather chemicals, and footwear manufacturing to showcase new technologies and products, which facilitated close interactions among participants and created an international platform for advancing leather technology research and its practical applications.

Grand Award Ceremony during the Congress

At the award ceremony for the 2023 IULTCS Merit Award, Prof. Jianzhong Ma from Shaanxi University of Science and Technology, jointly recommended by the China Leather Industry Association and the Taiwanese International Leather Association, after IULTCS member's voting, was awarded this honor, and received the award plaque from Dr. Luis Zugno and Dr. Joan Carles Castell.

At the closing ceremony, the award ceremony for the sponsoring companies of the 37th IULTCS Congress was also held.

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The Conference achieved fruitful results

All delegates, after two and a half days of conference discussions, have gained rich rewards. In the closing speech, Prof. Bi Shi, summarized the proceedings of the conference. He expressed gratitude to all parties involved in the preparation, organization, and services of the conference. He highly praised the 2023 IULTCS Congress for providing a crucial platform for enhancing the exchange of technological innovation achievements and fostering a consensus on sustainable industry development within the global leather industry. Through in-depth discussions, it effectively facilitated greater understanding, consensus building, expanded perspectives, and the exchange of achievements in the global leather industry. This plays a significant role in promoting sustainable progress in global leather science and technology.

The 38th Congress will be held in Lyon, France

Accompanied by the harmonious IULTCS anthem, President Yuzhong Li officially passed the IULTCS flag to the representative of the next Congress's organizers, Thierry Poncet. This marked the successful conclusion of this year's congress in Chengdu, China, and the beginning of the new term.

During the closing ceremony of the congress, Dr. Luis Zugno announced that the 38th congress would be held in Lyon, France, in September 2025. A promotional video for the upcoming congress was played at the event. Thierry Poncet, representing the organizers of the 38th IULTCS Congress in Lyon, introduced the historical and cultural aspects of Lyon, France, as well as the preparations for the next congress, extending a warm invitation to all attending delegates.

After the Congress, the delegates visited the National Engineering Laboratory for Clean Technology of Leather Manufacture and the Sichuan University Museum.

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Topics of Discussion

I
Advances in Leather Science Basic Research

II
Sustainable Technologies for Leather Manufacture

III
Novel Strategies in high-efficiency and Intelligent Leather Processing Technology

IV
Innovations in Leather Chemicals

V
Comprehensive Utilization of Leather Wastes

VI
Analytical and Test Methods for Leather and Leather Goods

VII
Sustainable Development of Leather Industry

VIII
Design Intelligence and Productivity Improve-ment in Footwear and Leather Products

-: The End :-

Influence of price, promotion, product quality, social factors, and brand image on purchase decisions for domestic leather footwear and accessories

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Abstract

Several factors influence customers' decision-making when choosing leather footwear and accessories, including price, promotion, product quality, social influences, and brand image. The research employs a mixed-methods approach combining descriptive and investigative methods within a quantitative framework to investigate the influence of variables in the context of consumer decision-making regarding the purchase of leather products from Sreeleathers, a prominent leather goods retailer situated in Kolkata. Purposive sampling was utilized in this study, selecting 100 individuals who actively wear leather products from Sreeleathers. Multiple linear regressions were performed using SPSS to analyze the data. The findings reveal that price, promotion, product quality, social factors, and brand image all exert significant influence on purchase decisions for leather footwear and accessories. Further, the study finds that customers' purchasing decisions concerning leather footwear and accessories from Sreeleathers are largely determined by brand image.

Keywords: price, promotion, product quality, social factor, brand image, purchase decision

1. Introduction

In an era marked by dynamic consumer preferences and an evolving retail landscape, the study of consumer behaviour and its impact on purchase decisions has gained paramount significance for businesses seeking to thrive in competitive markets. The leather footwear and accessory industry, in particular, stands as a vibrant microcosm of this complexity, where consumers navigate a myriad of choices influenced by price, promotional strategies, product quality, social factors, and brand image.

The Indian leather footwear and accessory industry displays a significant degree of fragmentation, with approximately 15,000 small and medium enterprises in the unorganized sector, whereas its organized counterpart maintains a relatively limited footprint. In the Indian economy, this industry plays an important role, in part by generating employment opportunities, particularly for economically disadvantaged segments of the population, and by contributing to foreign exchange earnings. On a global scale, India ranks as the second-largest footwear producer, contributing 9% to the annual global production of 22 billion pairs. Annually, India manufactures an impressive 2.2 billion pairs of footwear, with a substantial 90% of this production serving domestic consumption, while the remaining 10% finds its way to international markets, primarily in Europe.

Noteworthy is India's annual footwear consumption, which stands at 2.0 billion pairs, securing its place as the third-largest consumer globally, following China and the United States. This consumption has grown robustly in the past

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decade, propelled by rising incomes, fashion consciousness, and discretionary spending.

While exports account for just 10% of India's total footwear production volume, they contribute nearly one-third of its total revenue. This is primarily attributed to the relatively higher average selling price of exported footwear, predominantly comprising leather products, in contrast to the average selling price of footwear intended for the domestic market, which is predominantly non-leather (Bansal, 2022).

Kolkata, one of India's cultural and economic epicentres, bears testament to this intricate interplay of factors in its local footwear market. As the City of Joy flourishes, consumers are exposed to an array of footwear options, both domestic and international. Within this bustling marketplace, Sreeleathers emerges as an iconic brand renowned for its extensive range of leather footwear and accessory products. Its enduring presence and loyal customer base make it a fascinating case study to look into purchase decision dynamics.

Sreeleathers-the homegrown footwear brand

Sreeleathers, the company driving this value-for-money footwear brand, boasts the world's largest single-brand shoe store in Kolkata and plans to open 100 additional stores across the country. Sreeleathers is a 42-store nationwide chain doing what it set out for when freedom fighter late Suresh Chandra Dey started it in 1951 in Jamshedpur to sell durable and affordable shoes to the common man. At a time when leather footwear was considered a luxury, and the retail industry didn't cater to the middle-class population in India, he sought to make good quality leather footwear accessible to everyone (Chhetri, 2022).

Figure 1: Sreeleathers Lindsay Street Store

In the bustling streets of Kolkata, there exists an unspoken bond, an implicit pact between the people of Bengal and the brand Sreeleathers that has served them for more than three decades when Sri Satyabrata Dey came to Kolkata and started business selling footwear from a little shop on Lindsay Street. With a modest price range, it has not only remained true to its mission but exceeded expectations.

Throughout the years, Sreeleathers has not only survived but thrived, winning the hearts of its customers through top-notch products and exceptional service. No extravagant marketing campaigns, costly advertising, or celebrity endorsements could replicate what the people of Bengal have done for this brand. A unique bond has formed, an unspoken commitment, where Sreeleathers promises the best prices in the market, and the people of Bengal steadfastly support the brand.

The brand has expanded its footprint, owning the country's largest shoe store in Kolkata, North India's largest shoe store in Delhi, and South India's largest shoe store in Chennai. The brand is now set to enter cities like Mumbai, Bangalore and Hyderabad. The unique strategy of not carrying brand names on products allows Sreeleathers to keep overheads low, ultimately passing on affordability benefits to its customers. Sreeleathers store's name is their brand. This way (by not carrying brand names in products), the Company keeps its overheads down, which ultimately allows it to sell products at a price affordable for everyone.

Remarkably, Sreeleathers stores witness an average footfall of approximately 10,000 customers daily, surging to 25,000 during the festive season. This foot traffic nearly rivals the combined footfall of all major shoe brand stores in cities like Kolkata, with an impressive conversion rate of almost 80%. Additionally, the brand's decision to own all its store properties eliminates the pressure of escalating rents, a factor that often plagues store performance. This approach also eschews setting up stores in malls, further controlling costs.

Sreeleathers' efficient supply chain, maintaining just a day's inventory, eliminates warehousing costs. The brand sources all its shoes from a network of vendors, opting not to manufacture products in-house. These factors collectively enable Sreeleathers to offer products at prices that would be unsustainable for competitors. Consequently, the brand does not resort to discounts in its stores.

Sreeleathers, which has a turnover of Rs. 100 crores, has now expanded into foot care. Besides its core footwear business, it will introduce fitness shoes, therapeutic shoes, and orthopaedic shoes. Sreeleathers is committed to providing speciality footwear at prices significantly lower than those offered by high-end international brands in the same segments as part of its corporate strategy. This strategic move into foot care is complemented by a restructuring of its showroom formats (Nandi, 2021).

In summary, this research paper embarks on a comprehensive exploration of the factors that influence consumers in Kolkata when selecting footwear, with a special focus on Sreeleathers. By dissecting the roles played by price, promotional strategies, product quality, social factors, and brand image, this study aims to provide invaluable insights for businesses operating in the footwear sector. It also seeks to offer a deeper understanding of the preferences and behaviours of Kolkata's footwear consumers, shedding light on the remarkable relationship between the people of Bengal and Sreeleathers.

2. Literature Review

In the realm of marketing, various scholars have sought to define its essence and components. Kotler and Armstrong (2016) characterize marketing as the intricate process of offering products or services that cater to consumer needs, ensuring satisfaction, and concurrently yielding profits for the company. This view emphasizes the centrality of consumer satisfaction and profitability in the marketing domain. Moreover, Baker (2017) alludes to Kotler's influential theory, which posits that marketing management involves both art and science. It encompasses the discerning selection, acquisition, and retention of target markets, along with the creation, delivery, and communication of superior customer value.

Consumer behaviour, as articulated by Solomon et al., (2014) represents the gamut of actions related to the acquisition, utilization, consumption, and depletion of products or services, spanning the processes that precede and follow these activities. It becomes evident that consumer behaviour is an intricate and multifaceted phenomenon, given that marketing strategies are intricately designed to influence the behaviours of consumers, companies, individuals, and communities alike.

In the realm of marketing, price serves as a pivotal component of a company's management system, as outlined by Kotler and Keller (2021). By determining the foundational cost of a product or service, strategies relating to discounts, shipping costs, and shared variables can be developed. Price is not merely a revenue-generating element within the marketing mix; it also encapsulates cost considerations. Remarkably flexible compared to other marketing mix components, the price can be swiftly adjusted to meet market dynamics.

The product dimension revolves around the management of product elements, encompassing planning and development of the right product or service for market consumption, as elucidated by Kotler and Keller (2021). Consumers gravitate towards products offering superior quality, performance, or innovative features. Consequently, organizational managers focus on continually enhancing product quality.

Promotion emerges as a critical determinant of a product's marketing success. Widespread product exposure is contingent on the breadth of promotional coverage, as suggested by Andrew and Shimp (2018). Mappesona et al. (2020) posit that promotion constitutes a form of communication geared towards engaging and convincing potential customers about the merits of goods and services, with the ultimate goal of capturing their attention, educating them, reminding them, and persuading them.

In the social sphere, social factors comprise groups of individuals who share similar interests and behaviours and engage in ongoing social interactions, both formal and informal (Smith, 2017). These interactions, as posited by Kotler and Armstrong (2016), occur within relatively stable societies, where members work towards common objectives, shaping formal and informal networks that foster shared interests.

Brand image, as expounded by Keller and Kotler (2015), encapsulates consumers' perceptions and beliefs, as reflected in the associations formed within their memories. It represents the composite perception of a product and is heavily influenced by past experiences and information about the product. Gensler et al. (2013) characterize the product or service image as the total of impressions, beliefs, and associations that an individual holds regarding an object. This image strongly influences brand/service preferences and attitudes.

Kotler and Keller (2021) describe decision-making as an individual activity intricately involved in the acquisition and utilization of market goods. Consumers arrive at purchasing

decisions through the purchase decision process, illustrated in Figure 2 below, which consists of five distinct stages. Throughout the purchasing journey, each customer moves through each phase, emphasizing the dynamic nature of consumer decision-making.

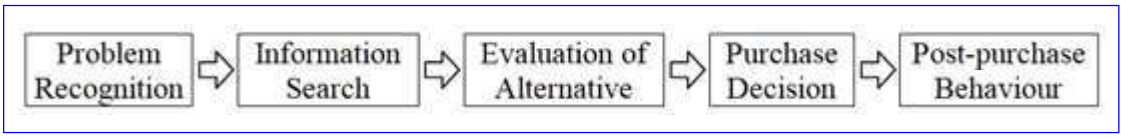


Figure 2. Stages of Purchase Decision Process [Source: Kotler and Keller (2021)]

The purchase decision process, as depicted in Figure 2, serves as a valuable framework for understanding consumer behaviour and how it influences their purchasing decisions and subsequent behaviour. This process can be delineated into distinct stages, each with its unique characteristics and significance. The following explanation provides more details.

***Problem Recognition*:** The initiation of the consumer purchase decision process commences with problem recognition. This is when consumers become aware of a problem or a need they seek to address through a purchase. This stage highlights the pivotal role of identifying consumer needs as the catalyst for the entire decision-making process.

Information Search : Following problem recognition, consumers are propelled into the information search phase. Here, they actively seek out information to better understand their needs and the available solutions. As consumers accumulate more information, their awareness and knowledge regarding the goods or services in question expand. This phase underscores the importance of providing accessible and comprehensive information to facilitate informed decision-making.

Evaluation of Alternatives : Armed with the information gathered during the previous stage, consumers move on to the evaluation of alternatives. In this phase, consumers compare and contrast various brands and offerings to determine which one aligns best with their needs and preferences. This highlights the critical role of factors such as product quality, price, promotion, and social factors in shaping consumers' perceptions of available alternatives.

Purchase Decision : With the evaluation of alternatives complete, consumers reach the purchase decision stage. Here, they make the actual purchase of the selected product or service. This stage represents the culmination of the decision-making process, where consumers commit to a specific choice based on their assessments of available options.

***Post-purchase Behaviour*:** Following the purchase, consumers enter the post-purchase behaviour stage, which is characterized by their experience of either satisfaction or dissatisfaction. If the product or service meets or exceeds their expectations, consumers are likely to be satisfied or even very satisfied. However, if the product falls short of expectations, dissatisfaction may ensue. This phase underscores the significance of managing customer expectations and delivering on promises to foster positive post-purchase behaviour.

Consumer purchase decisions are complex processes influenced by a multitude of variables, including price, promotion, product quality, and various social factors. In an ever-evolving marketplace, understanding the dynamics of these factors is essential for businesses to effectively target and engage consumers. Figure 3 presents a comprehensive framework that identifies price, promotion, product quality, social factors and brand image as independent variables contributing to consumers' purchase decisions. Brand image plays an important role in shaping consumers' perceptions and purchase behaviour within this framework. The brand image encapsulates consumers' holistic perception of a brand, encompassing aspects such as reputation, trustworthiness and emotional connections (Keller, 1993; Aaker, 1997).

Brand image, as an independent variable, influences consumer decision-making processes. Extensive research has highlighted the pivotal role of brand image in consumer behaviour. Nawaz et al., (2020) underscore that a positive brand image fosters strong and favourable associations between the brand and consumers, cultivating brand loyalty and increasing repeat purchases. Moreover, in an era characterized by information overload and fierce competition, Zhang (2015) emphasizes the ability of a carefully crafted brand image to differentiate a product or service in consumers' eyes.

The incorporation of a brand image into the framework depicted in Figure 3 is warranted due to its potential to shape consumer evaluations of choices and, consequently, their ultimate purchase decisions. This is especially pertinent in highly competitive markets, where consumers are inundated with options. A positive brand image can provide a competitive edge by building trust, mitigating perceived risks, and forging emotional connections with consumers (Kapferer, 2012).

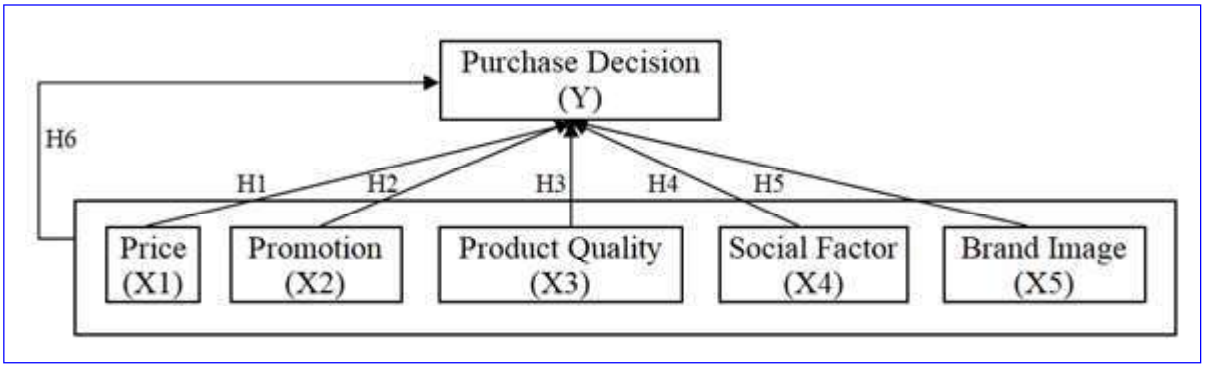


Figure 3. Research Framework

Based on theory and previous research, the following research hypothesis can be proposed:

H1: Price has a significant effect on purchasing decisions
H2: Promotion has a significant effect on purchasing decisions
H3: Product quality has a significant effect on purchasing decisions
H4: Social factor has a significant effect on purchasing decisions
H5: Brand image has a significant effect on purchasing decisions
H6: Price, promotion, product quality, social factors, and brand image simultaneously have a significant influence on purchasing decisions.

3. Methodology

Research Design **:** This research employs a mixed-methods approach combining descriptive and verificative methods within a quantitative framework to investigate the influence of variables in the context of consumer decision-making regarding Sreeleathers leather products.

Sampling Method**:** In this study, purposive sampling was used to select 100 participants who actively use leather products from Sreeleathers. To be eligible for inclusion, respondents must be at least 17 years old, as individuals below this age may exhibit less objectivity in responding to research questions concerning their purchasing decisions.

Data Collection **:** Primary data collection for this research on the use of structured questionnaires. Respondents will be presented with written statements and asked to provide their responses. These questionnaires utilize the Likert scale measurement technique, enabling respondents to express their degree of agreement or disagreement with statements related to their preferences and purchase behaviours concerning Sreeleathers leather products.

Measurement Technique **:** The Likert scale is utilized in this study, offering respondents five response options: (5) strongly agree, (4) agree, (3) neutral, (2) disagree, and (1) strongly disagree. The Likert scale is a well-established and straightforward method for collecting quantitative data, allowing for the quantification of attitudes and perceptions associated with the research subject (Malhotra, 2013).

4. Research Variable

In this research, several variables are employed to scrutinize the dynamics of purchasing decisions (Y) as the dependent variable, while considering price (X_1), promotion (X_2), product quality (X_3), social factor (X_4), and brand image (X_5) as independent variables. Each variable is operationally defined as follows:

Purchasing Decision **(Y) :** Purchasing decisions encompass individual actions directly involved in the acquisition and utilization of goods or services (Kotler and Keller, 2021). This construct is multi-dimensional, encompassing problem recognition, information retrieval, evaluation of alternatives, actual purchasing decisions, and post-purchase evaluation.

Price **(X_1) :** Price, as established in the literature, is a pivotal determinant of consumer buying behaviour (Kotler & Armstrong, 2016). It significantly influences the choices of consumers, particularly in sectors like telecommunications. The dimensions used to measure price variables in this study encompass price expectations offered by various service providers and available discounts.

Promotion **(X_2) :** Promotion is recognized as a fundamental factor with direct or indirect effects on consumer purchasing behaviour (Chandon et al., 2000). Within this construct, dimensions for measurement include word-of-mouth, effective ad design, and various advertising techniques.

Product Quality **(X_3) :** Product quality is a fundamental concept in marketing and consumer behaviour research. It represents an assessment of whether a product meets consumer expectations (Zeithaml, 1988). Quality has long been recognized as a crucial factor in influencing consumer behaviour and purchase decisions. Consumers often use quality as a primary criterion when evaluating products and making choices (Garvin, 1983).

Social Factor **(X_4) :** Social factors involve consumer behaviour in selecting products, where influences from friends and family play a significant role (Cialdini and Goldstein, 2004). The dimensions used to measure social variables in this study encompass references such as recommendations from family and friends.

Brand Image **(X_5):** The brand image captures the perceptions and beliefs held by consumers, which are reflected in the associations formed in their memory (Kotler and Keller, 2021).

This comprehensive framework of variables and operational definitions serves as the foundation for our research. It enables a thorough investigation into the multifaceted factors shaping purchasing decisions for leather products from Sreeleathers.

5. Data Analysis

In this research, data analysis employs the multiple regression analysis technique. Multiple regression analysis is employed when there is more than one independent variable influencing a single dependent variable. In this study, five independent variables are utilized: price, promotion, product quality, social factors, and brand image.

The rationale for utilizing the multiple regression analysis method in this research is twofold. Firstly, it facilitates a simultaneous examination, or F-test, of all five variables: price, promotion, product quality, social factors, and brand image concerning purchasing decisions. Secondly, it allows for the assessment of how these independent variables collectively impact the dependent variable.

This research utilized a multiple regression formula, outlined by Siegel (2016):

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5$$

Where:

Y = Purchase Decision
α = Constants
β = Coefficients Regression
X_1= Price; X_2= Promotion; X_3= Product Quality; X_4= Social Factor; X_5= Brand Image

6. Results and Discussion

In this research, hypothesis testing is conducted through multiple linear regression analysis. The multiple linear regression analysis assesses the study's hypotheses by examining both the t-test and the F-test values. The outcomes of these tests are presented in the table below:

Table 1 Multiple Linear Regression Test Result

	β	$t_{statistic}$	Prob.
Price → Purchase Decision	0.059	3.200	0.001
Promotion → Purchase Decision	0.104	3.859	0.000
Product Quality → Purchase Decision	0.107	5.119	0.000
Social Factor → Purchase Decision	0.041	2,008	0.045
Brand Image → Purchase Decision	0.563	18.622	0.000
		$F_{statistic}$	573.275 (0.000)
		R	0.941
		Adjusted R^2	0.884

Based on the table of t-test results can be made to answer the research hypothesis as follows:

Hypothesis 1 : In this study, our first hypothesis looks into the impact of price on purchasing decisions regarding leather footwear and accessories from Sreeleathers. This hypothesis is framed as follows:

Ho1 : Price has no significant effect on purchasing decisions

Ha1 : Price has a significant influence on purchasing decisions

We use the following terms for analysis:

- If the significance level (sig.) is greater than the alpha level (0.05), then we accept the null hypothesis.
- If the significance level (sig.) is less than the alpha level (0.05), then we reject the null hypothesis.

After conducting regression testing as shown in Table 1, the price variable yielded a significance value (sig.) of 0.001, which is less than the alpha level of 0.05. Additionally, the t-statistic of 3.200 exceeds the critical t-table value of 1.966 (with df = 371, and alpha 0.05).

Based on regression testing in Table 1, we reject Ho1 and accept Ha1. Therefore, we conclude that price significantly influences the purchasing decisions of leather footwear and accessories from Sreeleathers.

Furthermore, the findings from this hypothesis align with the research conducted by Anwar and Andrean (2021), which also highlighted the significant influence of price on buying behaviour. Consistent results were also observed in studies conducted by Djatmiko and Pradana (2016), Safitri (2018) and Andhyka et al., (2020) all of which underscore the partial but significant impact of prices on purchasing decisions.

Hypothesis 2: In this study, we turn our attention to the third hypothesis, which scrutinizes the impact of promotion on the purchasing decisions about leather footwear and accessories from Sreeleathers. This hypothesis is structured as follows:

Ho2: Promotion has no significant effect on purchasing decisions

Ha2 : Promotion has a significant influence on purchasing decisions

Upon conducting regression analysis as presented in Table 1, the promotion variable yielded a significance value (sig.) of 0.000, which is lower than the alpha level of 0.05. Additionally, the t-statistic of 3.859 exceeds the critical t-table value of 1.966 (with df = 371, alpha level 0.05). Based on these results, we arrive at the following conclusion:

Based on the outcomes of the regression analysis depicted in Table 1, we reject Ho2 and accept Ha2. Therefore, we conclude that promotion significantly influences the purchasing decisions concerning leather footwear and accessories from Sreeleathers.

These findings substantiate the research conducted by Andhyka (2020) which suggests that promotional strategies exert a partial yet significant impact on consumer purchasing decisions. Similar results are reinforced by the research findings of Prianggoro and Sitio, (2020) indicating that product promotion significantly influences customer behaviour in their decision-making process regarding product purchases.

Hypothesis 3: In the context of this study, the second hypothesis investigates the impact of product quality on the purchasing decisions related to leather footwear and accessories from Sreeleathers. This hypothesis is structured as follows:

Ho3: Product quality has no significant effect on purchasing decisions

Ha3: Product quality has a significant influence on purchasing decisions

We employ the following terms for our analysis :

After conducting regression testing as presented in Table 1, the variable representing product quality yielded a significance value (sig.) of 0.000, which is lower than the alpha level of 0.05. Furthermore, the t-statistic of 5.119 exceeds the critical t-table value of 1.966 (with df = 371, alpha level 0.05).

Based on the results of the regression analysis presented in Table 1, we reject Ho3 and accept Ha3. Therefore, we conclude that product quality significantly influences the purchasing decisions regarding leather footwear and accessories from Sreeleathers.

These findings are in line with the research conducted by Anwar and Andrean (2021), which also highlighted the significant impact of product quality on purchasing decisions. Similar results are supported by Aeni, N. (2020), who found a positive effect of product quality on purchasing decisions, and Steven et al., (2021), whose research demonstrates that product quality exerts a positive and significant influence on purchasing decisions.

Hypothesis 4: Within this study, our focus shifts to the fourth hypothesis, which scrutinizes the influence of social factors on the decision to purchase leather footwear and accessories from Sreeleathers. The hypothesis is structured as follows:

Ho4: Social factors have no significant effect on purchasing decisions

Ha4: Social factors have a significant influence on purchasing decisions

Following a rigorous regression analysis presented in Table 1, the variable representing social factors yielded a significance value (sig.) of 0.045, which is marginally less than the alpha level of 0.05. Furthermore, the t-statistic of 2.008 slightly exceeds the critical t-table value of 1.966 (with df = 371, alpha level 0.05). Based on these results, we arrive at the following conclusion:

Based on the outcomes of the regression analysis as outlined in Table 1, we reject Ho4 and accept Ha4. Therefore, we conclude that social factors significantly influence the purchasing decisions regarding leather footwear and accessories from Sreeleathers. These findings align with the research conducted by Kushwaha et al., (2015) which underscores the significance of social factors as the most influential factors positively impacting buying behaviour. Furthermore, the work of Dahl (2013) supports this conclusion by demonstrating the positive and significant impact of social factors on purchasing decisions. These findings are consistent with Bronner and Hoog's (2014) research, indicating a positive relationship between social factors and purchase decisions, although not necessarily significant.

Hypothesis 5: The fifth hypothesis in this study examines the effect of brand image on the purchasing decision of leather footwear and accessories from Sreeleathers.

Ho5: Brand image has no significant effect on purchasing decisions

Ha5: Brand image has a significant influence on purchasing decisions

Based on the results of the regression analysis presented in Table 1, the brand image variable yielded a significance value of 0.000, which is less than the alpha level of 0.05. Additionally, the t-statistic was computed to be 18.622, surpassing the critical t-table value of 1.966 (with df = 371, and alpha 0.05).

Consequently, Ho5 is rejected, and Ha5 is accepted. Therefore, it can be concluded that brand image does have a significant influence on the purchase decision of leather footwear and accessories from Sreeleathers.

These findings align with previous studies of Anwar and Andrean (2021), which found brand image impacts purchasing decisions, and Malik's (2013) study, highlighting the crucial role of brand image in shaping purchasing behaviour, with brand trust acting as a mediator in the relationship between brand image and buying behaviour. Furthermore, Fianto et al., (2014) research provides additional evidence, affirming that brand image indeed has a positive and significant impact on purchasing decisions.

Hypothesis 6: The sixth hypothesis in this study examined the influence of price, product quality, promotion, social factors, and brand image on the decision to purchase leather footwear and accessories from Sreeleathers.

Ho6: Price, promotion, product quality, social factor, and brand image simultaneously have no significant effect on purchasing decisions

Ha6: Price, promotion, product quality, social factors, and brand image simultaneously have a significant influence on purchasing decisions

Based on the results of the regression analysis presented in Table 1, each of the variables—price, promotion, product quality, social factors, and brand image—yielded a significance value of 0.000, which is less than the alpha level of 0.05. Furthermore, the F-statistic value was calculated to be 573.275, exceeding the critical F-table value of 2.238 (with df1 = 5, df2 = 371, and alpha 0.05).

These findings lead to the rejection of Ho6 and the acceptance of Ha6. In other words, the results indicate that when considered collectively, price, promotion, product quality, social factors, and brand image simultaneously have a significant influence on the purchasing decisions of leather footwear and accessories from Sreeleathers.

Study findings confirm Wood's (2004) research, which suggests quality is one of the most important factors influencing consumer purchasing decisions. Lee and Kacen (2008) emphasize that price plays a crucial role when determining an individual's product choice from a retailer. Further, Puccinelli et al. (2009) emphasize that the influence of friends and family on purchase decisions extends beyond the quality offered by retailers.

Table 1 reveals an R-value of 0.941, indicating a strong relationship between the independent variables—price, promotion, product quality, social factors, and brand image—and the dependent variable, which is the purchase decision. This suggests that these variables collectively account for 94.1% of the variance in the purchase decisions for leather footwear and accessories from Sreeleathers. Conversely, the Adjusted R Square value of 0.884, implies that the combined contribution and impact of the variables; price, promotion, product quality, social factors, and brand image—toward purchasing decisions is 88.4%, leaving the remaining 11.6% influenced by other unexplored variables in this study.

7. Conclusions

The study examines the factors influencing the purchasing decisions for leather footwear and accessories from Sreeleathers, including price, promotion, product quality, social factors, and brand image. Among these factors, brand image emerges as the primary determinant of purchasing behaviour within the community. This suggests that consumers place a significant emphasis on the perception and reputation of the Sreeleathers brand when purchasing. Moreover, our findings reveal a particular emphasis on the variety and customization of leather footwear and accessories from Sreeleathers, specifically catering to young consumers' preferences. Prices, promotion, quality, social factors, and brand image all play a significant role in consumer purchasing decisions when it comes to leather products from Sreeleathers.

8. Recommendations

Sreeleathers must prioritize the branding of its footwear and leather accessories as this has a substantial impact on customer buying choices. To achieve this, marketing campaigns and promotions should be geared towards elevating the brand's image to attract and retain customers. It is also important to keep in mind that promotions tailored specifically to the youth demographic can influence their purchasing decisions significantly.

Aside from branding efforts, it is important to highlight the inherent strengths of the products, including their functionality, design, and packaging. To truly excel, product differentiation from competitors and a wide range of product options are essential. Maintaining product excellence is equally vital. Given the intense competition in the leather product market, management must explore innovative strategies to gain a competitive edge.

Our research findings underscore the importance of establishing a robust brand image and fostering positive product images. Images are essential for influencing customer purchase decisions for Sreeleathers leather goods.

To further enhance our understanding and refine our marketing strategies, we recommend conducting comprehensive qualitative research. This research should be tailored to gain profound insights into consumer purchasing behaviour, particularly within the context of the ever-increasing competition in the leather goods market. These insights will serve as invaluable tools in crafting effective and targeted marketing approaches.

References :

1) Aaker, J. L. (1997). Dimensions of brand personality. J. of Marketing Res. 34(3), 347-356.

2) Aeni, N. (2020). Effect of product quality, prices and places on purchase decisions. Journal of Research in Business, Economics, and Education, 2(1), 391-398.

3) Andhyka, B., Yustisiana, R., Widyaningsih, M., & Hilmiyah, N. H. (2020). Predicting millennial consumers' purchase decisions from promotion, price and design. International Journal of Business and Technology Management, 2(3), 49-57.

4) Terence, A. S., & Andrews, J. C. (2013). Advertising, promotion, and other aspects of integrated marketing communications.

5) Anwar, M., & Andrean, D. (2021). The effect of perceived quality, brand image, and price perception on purchase decision. In 4th International Conf. on Sustainable Innovation 2020-Accounting and Management (ICoSIAMS 2020) (78-82). Atlantis Press.

6) Baker, M. J. (2017). Marketing strategy and management. Bloomsbury Publishing.

7) Bansal, A. (2022) How bright is the future of India's footwear industry, Indian Retailer. Available at: https://www.indianretailer.com/.../footwear (Accessed: 26 August 2023).

8) Bronner, F., & de Hoog, R. (2014). Social media and consumer choice. International Journal of Market Research, 56(1), 51-71.

9) Chandon, P., Wansink, B., & Laurent, G. (2000). A benefit congruency framework of sales promotion effectiveness. Journal of Marketing, 64(4), 65-81.

10) Chhetri, M. (2022) Bengal's popular brand, Sreeleathers, looking to expand its operations in North India, ED Times Youth Media Channel. Available at: https://edtimes.in/bengals-popular-brand-sreeleathers-looking-to-expand/ (Accessed: 26 August 2023).

11) Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. Annual Review of Psychology, 55, 591-621.

12) Dahl, D. (2013). Social influence and consumer behaviour. J. of Consumer Res., 40(2), 3-5.

13) Djatmiko, T., & Pradana, R. (2016). Brand image and product price; Its impact for Samsung smartphone purchasing decision. Procedia-Social and Behavioral Sci. 219, 221-227.

14) Fianto, A. Y. A., Hadiwidjojo, D., & Aisjah, S. (2014). The influence of brand image on purchase behaviour through brand trust. Business Management and Strategy, 5(2), 58.

15) Garvin, D. A. (1983). Quality on the Line. Harvard Business Review, 61(5), 65-75.

16) Gensler, S., Völckner, F., Liu-Thompkins, Y., & Wiertz, C. (2013). Managing brands in the social media environment. Journal of Interactive Marketing, 27(4), 242-256.

17) Kapferer, J. N. (2012). The new strategic brand management: Advanced insights and strategic thinking. Kogan Page Publishers.

18) Keller, K. L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. Journal of Marketing, 57(1), 1-22.

19) Keller, K. L., & Kotler, P. (2015). Holistic marketing: a broad, integrated perspective to marketing management. In Does marketing need reform?: Fresh perspectives on the future. Routledge.

20) Kotler, P., & Armstrong, G. M. (2016). Principles of marketing. Pearson Education India.

21) Kotler, P., & Keller, K. (2021). Marketing Management (15th Global ed.). Pearson Edn. Ltd.

22) Kushwaha, B. P., Rao, N. S., & Ahmad, S. Y. (2015). The factors influencing consumer buying decision of electronic products. Management Dynamics, 15(1), 5-15.

23) Lee, J. A., & Kacen, J. J. (2008). Cultural influences on consumer satisfaction with impulse and planned purchase decisions. Journal of Business Research, 61(3), 265-272.

24) Malhotra, N. K. (2013). Basic marketing research. Pearson Higher Ed.

25) Malik, M. E., Ghafoor, M. M., Iqbal, H. K., Ali, Q., Hunbal, H., Noman, M., & Ahmad, B. (2013). Impact of brand image and advertisement on consumer buying behaviour. World Applied Sciences Journal, 23(1), 117-122.

26) Mappesona, H., Ikhsani, K., & Ali, H. (2020). Customer purchase decision model, supply chain management and customer satisfaction: Product quality and promotion analysis. International Journal of Supply Chain Management, 9(1), 592-600.

27) Nandi, D. (2021) Sreeleathers scales new heights under the aegis of third-generation entrepreneur, The Hindu. Available at: https://www.thehindu.com/.../sreeleathers scales new heights entrepreneur/ (Accessed: 26 August 2023).

28) Nawaz, S., Jiang, Y., Alam, F., & Nawaz, M. Z. (2020). Role of brand love and consumers' demographics in building consumer-brand relationship. Sage Open, 10(4), 1-19.

29) Prianggoro, N. F., & Sitio, A. (2020). Effect of service quality and promotion on purchase decisions and their implications on customer satisfaction. International Journal of Engineering Technologies and Management Research, 6(6), 51-62.

30) Puccinelli, N. M., Goodstein, R. C., Grewal, D., Price, R., Raghubir, P., & Stewart, D. (2009). Customer experience management in retailing: understanding the buying process. Journal of Retailing, 85(1), 15-30.

31) Safitri, I. (2018). The influence of product price on consumers' purchasing decisions. Review of Integrative Business and Economics Research, 7, 328-337.

32) Siegel, A. F. (2016). Practical business statistics. Academic Press.

33) Smith, L. (2017). Shared interests and social connections. Journal of Social Psychology, 14(1), 65-78.

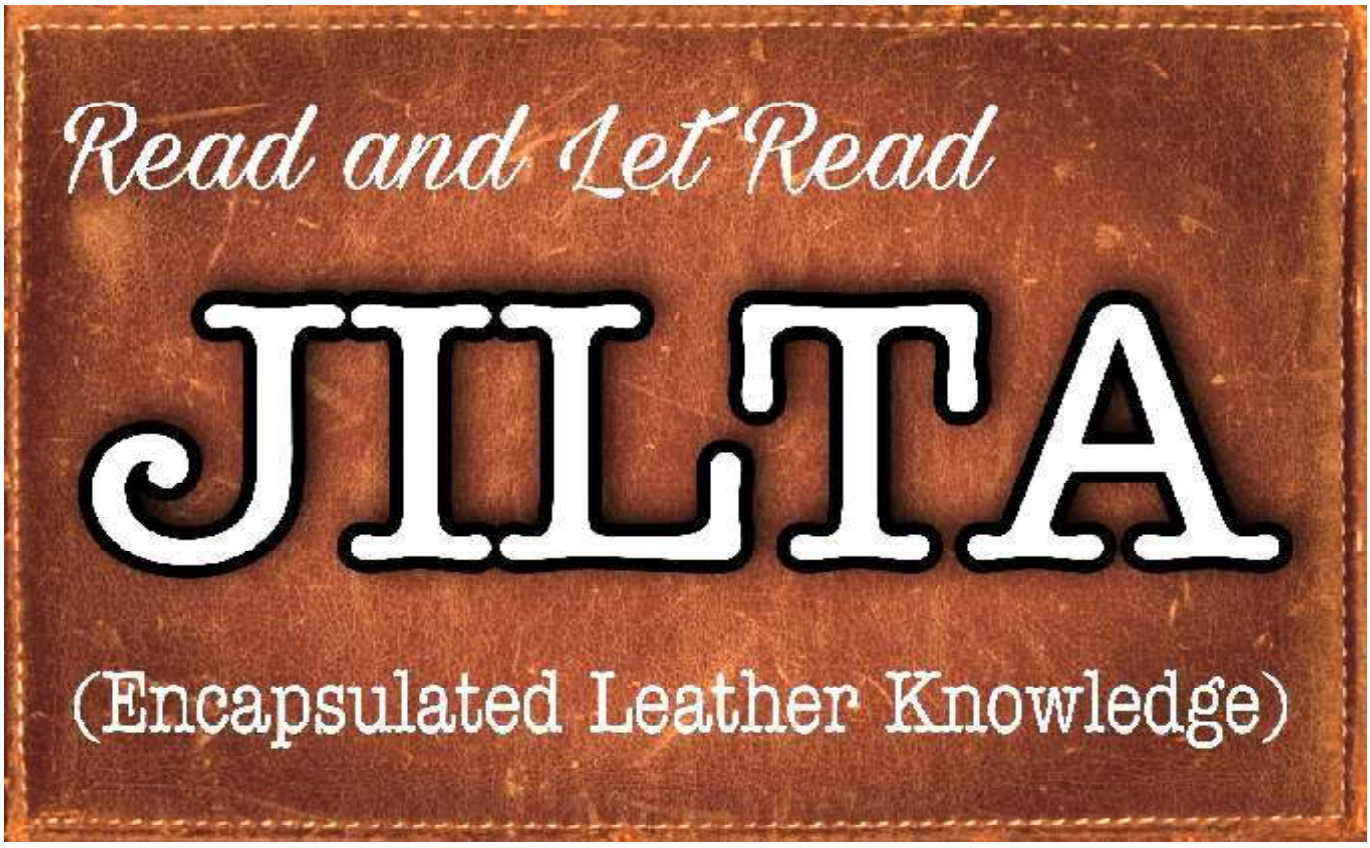
34) Solomon, M. R., Dahl, D. W., White, K., Zaichkowsky, J. L., & Polegato, R. (2014). Consumer behaviour: Buying, having, and being (Vol. 10). London: Pearson.

35) Steven, W., Purba, J. T., Budiono, S., & Adirinekso, G. P. (2021). How product quality, brand image and price perception impact on purchase decision of running shoes. In Proceedings of the Int. Conf. on Industrial Engg. & Operations Mngt, 5(8), 1289-1297.

36) Wood, L. (2004). Dimensions of brand purchasing behaviour: Consumers in the 18–24 age group. Journal of Consumer Behaviour: An International Research Review, 4(1), 9-24.

37) Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. Journal of Marketing, 52(3), 2-22.

38) Zhang, J. (2015). The influence of brand image on purchase behaviour: A comparative analysis of branded smartphones. Journal of Int. Business Res. and Marketing, 1(7), 7-19.



XXXVII IULTCS Congress Chengdu, China - A Report

Dr. S. Rajamani

Vice President, Indian Leather Technologists' Association (ILTA), Chennai

XXXVII International Union of Leather Technologists and Chemists Societies (IULTCS) Congress was held in Chengdu, China during 17th to 20th Oct.2023. IUTLCS Congress has been organized by China Leather Industry Association (CLIA) in association with Biomaterials and Leather Engineering Department of Sichuan University, Chengdu. The congress was held in Chengdu Xanadu Hotel, Chengdu, China which nearer to Sichuan University.

More than 400 participants, including scientists and technologists from 21 countries and regions such as China mainland (90%), India (10 Nos.), Taiwan, New Zealand, France, Italy, Spain, Germany, Romania, the United Kingdom, the United States, Ethiopia, Russia and others, along with industry professionals, and media representatives, gathered to exchange ideas and research, and discuss the latest research achievements, technological trends, and developments in World Leather Industries. No participation from Turkey, Japan, South American countries such as Brazil, Argentina, Colombia, etc. The registration counter opened on 17th Oct.2023 afternoon at the congress hotel. Most of the delegates stayed in the congress hotel for better logistic and convenience.

Mr. Chen Zhanguang, Vice Chairman of China Leather Industry Association presided over the opening ceremony. Mr. Yuzhong Li - Chairman of CLIA, Mr. Liangyin Chu - Vice President of Sichuan University, Prof. Bi Shi from Sichuan University, President of Scientific Committee of the Congress and Mr. Joan-Carles Castell - Vice President of IULTCS delivered speeches during the inauguration.

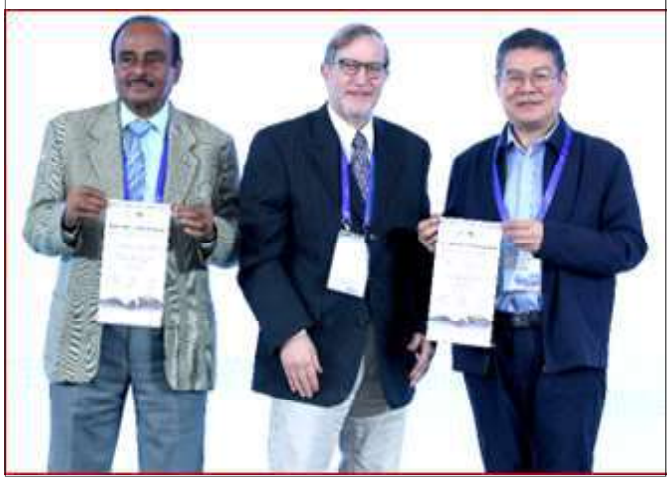
The conference was inaugurated on 17th Oct.2023 morning. The technical sessions started with keynote presentations. There were 47 oral presentations, 14 fast oral presentations in 9 sessions and 95 poster presentations during 17th to 20th Oct.2023. IUTLCS Congress overall program schedule is attached in Annexure-1.

Indian Leather Technologists Association (ILTA) was represented by Dr. S.Rajamani, Vice President of ILTA. Indian representation was well received by IULTCS, CLIA and organizers. He made a Scientific presentation on the title "Ozone in reduction of pollutional load and Removal of colour – innovative technologies". The advanced technological system developed is based on the pilot and full-scale application for treating 3000m^3/day of effluent in one of the CETPs in India.

Scientific presentation by Dr. S. Rajamani, Vice President, ILTA and interaction with participants

The presentation was well received and many appreciated the new technological developments which is First of its kind in the World and has been developed with huge investment of more than 1.0 million USD (i.e., about Indian Rs.10.00 crores). The merits and scope for replication of the technology was also discussed during the congress. The full text of the paper and PowerPoint presentation are attached in Annexure 2 & 3 respectively. In addition to the Scientific presentation Dr. S. Rajamani chaired the Session No.9 and conducted the proceedings within the prescribed time limit.

The chairs were honoured by the past President Mr. Dietrich Tegtmeyer from Germany and present IULTCS Secretary Dr. Luis Zugno.



Session 9 Chairs : Dr.Sengoda Gounder Rajamani & Prof. Keyong Tang

Dr. Vasanth Swaminathan, Research Scholar from SRM Institute of Science and Technology, Chennai, India made a scientific presentation under the title "Reduction of carbonization and gas emissions using mechatronics based intelligent laser beam machining for cutting leather with better environmental measures for operator health". This technical paper received "Merit Award" under research students' category.

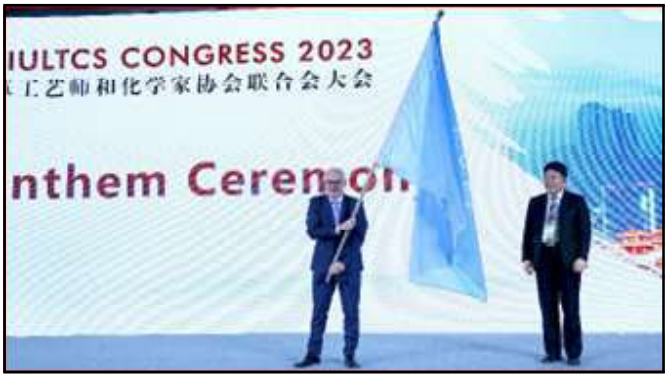
Mr. Venkatesan Natesan, Research Scholar from CSIR-CLRI, Chennai, India under the guidance of Dr. Nishad Fathima, Chief Scientist, CLRI made a scientific presentation under the title "Sustainable porous activated carbon as a potential electrode material for flexible supercapacitor application".

The contributions of Indian Scientists and Technocrats for the IULTCS mainly representation from ILTA and CLRI from India were appreciated by the President and Secretary of IULTCS.

During the closing ceremony Dr. Theirry Poncet of CTC, Lyon, France made a video presentation on the XXXVIII IULTCS Congress scheduled during September 2025 in Lyon, France. Mr. Yuzhong Li, Chairman of CLIA handed over the IULTCS Flag to Dr. Theirry Poncet.

Dr. Theirry Poncet made a request to ILTA, CLRI and other Indian technical & scientific organizations for participation in large number in the proposed IULTCS Congress in Lyon, France. Mr. Joan-Carles Castell, Vice President of IULTCS (President elect) and Dr. Luis Zugno, Secretary of IULTCS appreciated the

contributions of India with specific mentioned about the role of Dr. S.Rajamani as the longest served IUE Commission Chairman of IULTCS and making the commission a vibrant one. IULTCS representatives requested for the continued support and contribution from ILTA, CLRI and other Indian leather sector institutions for the better prospects of IULTCS.



Mr. Chen Zhanguang, Vice President of CLIA recalled and appreciated the long-term association between CLIA & ILTA in organizing the Asian and IUTLCS Congresses in Asian regions particularly in India and China. He has honoured Dr. S.Rajamani for his continued guidance, support and cooperation for the past 20 years.

OBSERVATIONS & VIEWS

XXXVII IULTCS Congress 2023 is organized only with physical participation due to the unsuccessful experience of hybrid / virtual mode in the previous congress. Though there are more than 400 delegates, more than 90% delegates are from China that too mainly from Sichuan University. India is the Second biggest delegation with about 10 participants including Indian origin scientist from New Zealand. No participation from Brazil, Argentina, etc. and single digit from participation from USA and European countries. This is mainly due to the fear of pandemic and difficulties in getting visa and other logistics such as limited flight connections. Airports, malls and tourist locations are practically empty.

The technical and scientific papers are mainly from collagen, by product recovery for reuse, issues and options on the use of restricted chemicals, circular economy, etc. The view of converting only 25% of the hides and skins into leather and leather products is highlighted and the need for addressing the 75% parts of the wastage is emphasized during the presentations. Using the raw hides and skins as cheap protein food by countries such as Indonesia & Africa may become a challenge.

The demand in finished leather and profit in leather making are reducing. The environmental costs and accumulation of residual solid wastes are major challenges and may not be sustainable. Many leather research institutions in Europe and other countries are closed. Competition from synthetic shoe and other products with reasonable quality and comfort are increasing. Some of the remaining institutions focusing their research and education in allied areas such as biomaterial, by product manufacture, circular economy, etc. and the names are of the leather institutes are being changed. It will be a challenging future for the sustainability of the leather research and manufacturing industries.

VISUAL DURING THE CONGRESS SESSIONS

Group photo of Chinese delegates (90% participants from China) – Limited participation from other countries – No participation from Japan, South American countries

Decorated Bridge on the River in the middle of Chengdu Town (Night time view)

Cultural program during Gala Dinner

Lake Resort with Hot Pot (Exotic Spicy Food) Restaurant

Photo taken during dinner - Exotic spicy food cooked on table

INDIA BRINGS MAJOR FOOTWEAR & LEATHER SHOW TO LONDON

The Council for Leather Exports (CLE) India in partnership with the British Footwear Association (BFA) launched a major two-day India Footwear & Leather Products Show in London on Thursday. India's leather footwear and products boast annual exports exceeding GBP 4 billion and the UK show has been conceived to promote Indian products highly sought after by global buyers.

"British industries recognise India as an essential source for leather products and footwear," said the British Footwear Association in a statement.

The High Commission of India in London hosted a special curtain-raiser on Wednesday for the show to highlight India's global standing as the second-largest producer of footwear and second-largest exporter of leather garments. Besides, Indian firms are also the third-largest exporter of saddlery and harness and fourth-largest exporter of leather goods.

"Chairman of CLE Sanjay Leekha introduced the participants to recent achievements of the Indian leather sector. The potential of the leather, footwear and accessories sector in India was highlighted by various speakers," the Indian High Commission said in a statement.

"This was followed by a detailed presentation on the Indian Footwear and Leather Industry by R. Selvam, Executive Director, CLE. Industry experts like Lucy Reece-Raybould, CEO of British Footwear Association, and Dr N. Mohan, CEO of Kothari Industrial Corporation Limited, also spoke about the investment trends and opportunities in the Indian footwear sector," it added.

The curtain-raiser was also attended by the representatives from the British Footwear Association (BFA) and prominent leather and footwear brands and entities including Dr Martens, Grenson, Global Footwear Solutions, UK Fashion and Textile Association, Wander Studio, Pip and Henry etc. The event concluded with an interactive session between the exhibitors and participants.

The CLE, under the Ministry of Commerce and Industry, is the single-largest and apex trade promotion organisation of the strong and rapidly growing Indian leather and leather products industry. CLE is committed towards the overall development of the Indian leather sector and achieving higher export growth to enhance India's share in global leather trade.

(Economic Times – 02/11/2023)

INDUSTRY EXPERT RECOMMENDS LEATHER USE AS A SOLUTION TO OCEAN POLLUTION

In response to the World Economic Forum's (WEF) social media inquiry about addressing ocean pollution, Dr. Dietrich Tegtmeyer, a prominent industry commentator, proposed an unconventional solution: the increased utilization of leather in various products. This question from WEF was part of their recognition of the efforts of The Ocean Cleanup, a non-profit organization dedicated to developing technological solutions for plastic waste removal from the world's oceans.

The primary objective of The Ocean Cleanup is to eliminate 90% of ocean debris by the year 2040. According to their estimates, plastic constitutes a staggering 80% of the total waste found in our oceans, with an annual influx of 14 million tonnes of plastic into the world's waters.

The organization's current technology involves deploying a skimming device, which is extended between two vessels. In a recent operation conducted in the North Pacific, this skimming device successfully gathered 11 tonnes of plastic waste in just one week. Subsequently, the collected plastic was transported to British Columbia in Canada for sorting and recycling.

Building upon the insights gained from this successful approach, The Ocean Cleanup is preparing to launch an even larger skimming device, three times the size of the current one. It was during the celebration of this development that WEF reached out to social media users for their suggestions.

Dr. Dietrich Tegtmeyer, serving as the global head of business development and industry relations at TFL, a leading manufacturer of leather chemicals, pointed out a remarkable observation. He highlighted that the 11 tonnes of waste collected by The Ocean Cleanup during their recent North Pacific mission did not contain any traces of leather.

Dr. Tegtmeyer explained, "There were 11 tonnes of trash, and not a single gram of leather." He attributed this absence of leather in the collected waste to the likelihood that any leather present in the waste streams would have biodegraded during its journey to the ocean.

(Leather International – 30/10/2023)

INDIAN LEATHER ORDERS AT RISK IN ISRAEL/HAMAS CONFLICT

Around Rs. 500 crore (US$60 million) in leather orders for Israel from Kanpur exporters are reportedly on hold or awaiting payment.

Businesses in Kanpur have expressed their concerns over a lack of payment from customers in Israel relating to products such as safety shoes and boots, bags and saddles.

Many orders are ready out for shipment but cannot be sent because of the escalating conflict. Other manufacturers have reported that orders have been delivered but payments have not been released due to ongoing tensions.

Alok Srivastava, Assistant Director of the Federation of Indian Export Organisation, said that the conflict will lead to a crisis in exports to European countries and that losses will continue to increase if the situation continues.

(https://internationalleathermaker.com – 13/10/2023)

THE LEATHER SUPPLY CHAIN IS FULL OF JOBS THAT MATTER – MIKE REDWOOD

Any reasonable world requires societies to provide decent jobs for its people. Whether it is explained by the Brundtland definition of Sustainability, the Sustainable Development Goals or straightforward common-sense, citizens require fulfilling work.

Since the 1990s, governments have increasingly made policy moves suggesting that all such work will need a university degree. This foolishly overlooks carpenters, bricklayers, plumbers, train drivers and ambulance drivers along with hundreds of other jobs that require a sound education and good training but not bachelor's degrees.

For centuries, the leather trade has provided many of these jobs and continues to do so, but why do we do rarely discuss it? It is heartening to see every part of the industry now promoting one of the great environmental strengths of leather:

its durability, as well as the fact that most articles made with it can be repaired. This is an aspect of leather as a truly sustainable material that was widely ignored until the last few years. Tanners knew it, of course, but promoting and developing the point was considered of no value.

The value of leather industry jobs

A similar disinterested attitude appears to apply to the many types of employment to be found in the wider leather network, or filière as the French define it.

It is important that the leather industry grasps the huge number of jobs found throughout the tannery, from the limeyard to finishing, and across the supply chain, including the making of shoes, gloves, garments and all manner of other things with leather. A well-equipped modern tannery employs numbers in single figures in unhairing and liming, whereas its finishing department, even with the best equipment, will need more to manage equipment, chemicals and the movement of goods. The tens or hundreds of employees in the tannery soon jumps into many thousands when considering all of the factories that produce leather products from leather goods to footwear.

These jobs matter. Not everyone is suited to sit behind a computer – a lot of people want to work with their hands. And, with longer working lives likely to involve different types of employment, it could be only one stage for some.

However, it should be said that we often see those who start working with leather enjoying it so much that they proudly stick with it into old age. The old identifier of "shoe dogs" is not a made-up term, they are real folk who love working with products made of leather.

And these jobs should exist to offer opportunity in all countries, particularly in places such as the Indian subcontinent and Africa where growing populations require millions of new jobs every year. Just as they need to exist in older markets where many people still want to work in design and manufacturing.

Love of luxury

We also need to counter another trend that appeared in the 1990s: an excessive love of the luxury market. When we were talking about marketing the leather "brand" in the late 1980s and 1990s, industry leaders argued that anything beyond a brochure and a few swatch books would be an error. With hide and skin supply not linked to the growing demand for leather, any promotion would only upset the price structure, they said. Thus began an argument that rising populations and wealth would raise demand for leather and with it the price of leather and margins for tanners, making leather more of a luxury item. No need to mess about with wasteful marketing, they cried. Sometimes, whole industries can be foolish.

While leather is well suited for the luxury market, offering quality, exclusivity, longevity and beauty to brands that see their luxury products in enduring terms, it is not a luxury material per se. Leather is an honest material, hardworking and suitable for the tough moments and inclement weather just as much as the luxury automobile or the gentile salon.

Certainly, countries such as France and Italy have built fabulous reputations based on high-end artisanship, paying attention to every detail from raw material choice to the perfection of every stitch. They continue to create tens of thousands of high-quality jobs making their fine products. But the 20 billion plus square feet of leather produced each year worldwide is mostly far from the unaffordable prices of even "accessible luxury". if such a thing can truly exist.

The vast majority of leather is produced through skilled manual work by hardworking people, trained to handle hides and skins, assess their quality and work with them in a very wide variety of ways. It is time that, as an industry, we acknowledge wholeheartedly that this work is not a second-rate career but holds real value for individuals and society.

Along with the value of natural materials, and stupidity of promoting fossil-based fabrics, any tanning industry representatives attending COP28 should remember that leather industry jobs have had a key role in pulling much of the world out of poverty – think of South Korea and China in recent times – and, given a chance, will do it again throughout the Global South. Jobs in the wider leather industry do matter.

(https://internationalleathermaker.com – 31/10/2023)

'DEATH OF AN INDUSTRY': WHY ARE TANNERS LOOKING BEYOND KANPUR?

Amid what insiders describe as the biggest slump in the famed leather industry here, the tanners of Kanpur are moving to West Bengal, Bangladesh and to other greener pastures to stay afloat.

Their departure is triggered by the infrastructure curbs imposed because of tighter pollution control norms, a big jump in the cost of treatment of tannery waste and orders drying up in the midst of the lack of availability of cow leather due to a ban on cow slaughter in Uttar Pradesh, those in the trade say.

Already, 40 leather industrialists have rented or bought tanneries in Kolkata. Some have entered into partnerships in Vietnam, Turkey, and some European countries for finished cow leather, they say. Moreover, nearly 100 have taken land to start tanneries in Bantala, where the West Bengal government is providing plots at Rs. 2,865 per sq metre to tanners from Uttar Pradesh. Nayyar Jamal, president of Jajmau Tanners' Association, admits to the shift. "Of the 402 listed tanneries, only 215 small and big are operational now. These, too, function with a lot of riders that have made business next to impossible," he says."Still people are pulling through in the hope that the situation will improve someday," Jamal adds.

Trouble began at the fag-end of 2017 when the Central and State Pollution Control Boards asked the tanneries to cut down their infrastructure by half. It meant, for example, that a tannery with 10 drums used to process leather would be reduced to five."I had a unit with five drums, which all were taken out and fresh were installed in line with the order," says Jamal. The boards had made it clear that the tanneries would be shut down in case of non-compliance. This order was followed with prolonged closure of tanneries for Kumbh and Magh Melas. Another key factor is that Kanpur has been tanning a minuscule quantity of cow leather for which only skin of the dead animals is available since cow slaughtering is banned in Uttar Pradesh.

As doing business became difficult, a businessman in his early 50s and fourth generation into leather tanning trade hurriedly set off to Kolkata in 1918 to rent a small but closed tannery, once in the use of the Chinese community. The deal went through, and with little investment the tannery was made operational. Five years down the line, the tannery has become the mainstay in keeping his leather business afloat. "I have bought this tannery in Kolkata; doing business from Kanpur has become extremely tough. I am not supposed to run my Kanpur unit at more than 25% capacity," says this businessman, now setting up his second unit in Kolkata's Bantala. At least two big groups that were recently raided by the GST, are setting up shops in Bangladesh—one of them has completed a big unit and the other was on the cusp of doing so in Chittagong. Another major group has already acquired land but has not started work yet. The situation has arisen even though, in the last two decades, the global leather industry has been surging ahead in all segments, particularly in export of finished buffalo leather for upholstery and harnesses for saddlery. At one time, Kanpur was exporting 56% of buffalo leather and meeting the harness needs of the saddlery industry. "Now we are importing harnesses from Argentina. Sad, for an industry that has a share of 80% in global saddlery market. Saddlery is unique to Kanpur," says an industrialist, adding that exports and domestic sales both have seen an annual drop of 10% on an average.

"The confidence of buyers is shaken in us; the orders are drying up. The buyers have started looking elsewhere for hassle-free delivery of orders. That is why people are moving out of Kanpur or at least setting up a parallel unit in other states and countries," says an industrialist importing wet-blue (semi-processed leather). "We do not get good quality leather especially the cow one, so we import to meet the need for a top class finished leather." "Cow leather mostly is processed in Chennai and Kolkata where there is no such ban; we import the wet blue from outside India because animal is of superior quality and skinned in a way the hyde carries less cuts," he says. In 2020, the tanneries were told to operate at 50% of capacity 15 days a month on a rotation basis failing which a penalty called environment compensation of Rs. 12,500 per day would be levied.

Meanwhile, the cost of treatment of tannery waste went up from Rs.2 per hide to Rs. 22 per hide in 2022. The tanneries pay for treatment of effluents going to common treatment plant (CTP) managed by the Jal Nigam from primary treatment plants (PTPs) in tanneries. "The cost per hide today is Rs. 88 as tanneries are technically running merely at 25% of capacity. Small and medium players have already moved out of the system," says a top businessman, adding that in 2014, the Prime Minister had given a push to the leather sector by placing it in Make in India while the chief minister had done so by naming it in One District One Product (ODOP).

(Hindustan Times – 18/07/2023)

CALERES ANNOUNCES ONE PLANET STANDARD LABEL

Footwear manufacturer Caleres has announced the One Planet Standard designation for products that meet or exceed 51% on its Sustainable Footwear Index.

The company noted that around 75% of its products contain at least one "environmentally preferred material" (within the categories of fabrics, leather, synthetic leather and shoe bottoms) and almost 20% meet the criteria needed to earn the One Planet Standard designation.

Caleres noted that its environmentally preferred leather is sourced from tanneries audited by third parties including the Leather Working Group (LWG), Oeko-Tex Leather Standard and the Institute of Quality Certification for the Leather Sector (ICEC).

Natelle Baddeley, Chief Design and Product Officer at Caleres, said: "The One Planet Standard is part of our ongoing ESG efforts and something we're very proud to introduce. We take very seriously our responsibility to create shoes that are not only beautiful, fashionable, and comfortable but also lighter on the planet. Making conscious choices about how we design, the materials we use, and how we manufacture products is not just good for business – it's the right thing to do."

(https://internationalleathermaker.com – 06/11/2023)

REGENERATIVE FUND FOR NATURE OPENS 2024 GRANT APPLICATIONS

The Regenerative Fund for Nature has opened its 2024 grant applications, inviting project applications from the cotton, leather, cashmere and wool supply chains.

The Regenerative Fund for Nature is a partnership between Conservation International, Kering and Inditex which supports sustainable agriculture projects in the fashion supply chain.

Applying projects are required to align with the following principles:

- Soil Health – Increasing lands' capacity to sequester carbon, hold and filter water, and improve other elements of soil functionality
- Biodiversity – Protecting, restoring and enhancing biodiversity, both on farms and in surrounding lands
- Livelihoods – Supporting the livelihoods of farmers and local communities
- Synthetic Inputs – Reducing and eliminating the use of synthetic agrochemicals by favouring ecological solutions
- Animal Welfare – Enhancing the welfare of farmed livestock and surrounding wildlife.

Funding is available for projects in Argentina, Mexico, Peru, the United States, Turkey, Uganda, India, Tanzania, France, Italy, Spain, Australia, Greece, Morocco, South Africa, New Zealand, Uruguay, China (Inner Mongolia) and Mongolia. Grants will range from US$120,000-620,000 and covering 3-5 years, available for businesses including micro, small and medium enterprises, farming groups, project developers and raw material aggregators committed to regenerative agriculture.

Applicants will be required to submit a letter of inquiry by November 12, 2023, prior to a full application, with final awards announced in March 2024. Find out more on the **Regenerative Fund for Nature website**.

(https://internationalleathermaker.com/ - 26/10/2023)

Valorisation of Invasive Species - for Leather, Fur, Bristle, Meat and By-Products

(Part-10)

Subrata Das, M.Tech (Leather Technology) & Freelance Leather Technologist & Consultant

Capybara (Carpincho)

Known as The Capybara in Brazil (Portuguese) and elsewhere around the world , and Carpincho in Hispanophone countries(1), and largest of all the 1729 species of living rodents(2), these semi-aquatic mammals live and multiply, partly on land (terrestrial) and partly in water (aquatic). They grow up to 4 ft in length and can weigh between 36-66kgs - relegating beavers, which grow to a maximum of 1.5 feet tall and weigh 16-30 kg, to the second position among mammals of the order Rodentia (3)(4)

It is believed that capybaras were first accidentally introduced to the forests of northern Florida, in 1994, when eight animals escaped from a captive herd of the Lubee Foundation in Gainesvile , Alachua County, in the north-west of the sunshine state, when a tropical storm caused a paddock fence to be blown down. The octet made a getaway through the resultant breach. Subsequently, by 1995, all the runaways were tracked down and secured but not before they had increased in numbers, in northern Alachua County between Monteocha and La Crosse. This innocuous “jailbreak” is assumed to the the prime mover of the capybara habitation around O’Leno State Park and the Santa Fe River, breeding and thriving in the Florida Wilds. Interestingly as many as thirty-eight more of the murine were apprehended and removed from the area, in the following years.

During the next two decade, capybaras have been reported from Jacksonville, Gainesville, Paynes Prairie, with dozens of sightings north of the Bay Area and one from Tampa There have been sightings of them as far south as Cape Coral (5)(6). The herbivorous mammal has been encountered as far afield as in Paso Robles, California (7) Texas County, Missouri,(8) Florence, Arkansas(2).As recently as in July 2022, a bowfisherman killed a capybara by the St. Mary’s River, a tributary of the Mississippi, in Randolph County, Illinois(9).Some of these solo capybaras were runaway or “rogue” pets or exhibits, fleeing enclosures compromised by storm and rain, as in Westover Air Reserve Base, Massachusetts, exploiting breached fences or prying through kennel wires.

It was in 1992 that a capybara was first seen in Florida ,east of La Crosse (Alachua County), south of the Santa Fe River. The dead herbivore, victim of a road kill, discovered by a Myakka

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River State Park ranger, was later identified, as an adult capybara. The fatal accident took place on State Road 72, immediate eastward of Myakka River Bridge, which spans the relatively undeveloped river at a big flood plain marsh. The animal-vehicle collision was assumed to be a direct result of the capybara's crepuscular or nocturnal foraging, since four - fifths of its diet is provided by five distinct type of riparian species of grass. The rodents also forage on aquatic weeds, plants and on occasion bark of trees, fruit and berries which fall to the ground(10).

Capybaras possess the ability, means and attributes of living in a vast and large variety of habitats adjacent to water bodies that do not parch but retain most of their volume throughout the year. Forested riverbanks, wetlands, and mangrove swamps constitute these habitat types in the sunshine state– eminently suited for the sociable and resilient animals to procreate, quench thirst from, forage and seek sanctuary in and carry out integumentary thermoregulation.

The obligate herbivores are selective eaters, with a diet consisting of specific aquatic plants and grasses. Only during the dry season when food is less abundant do they eat a wider range of vegetation In addition to water, While requiring sweeping areas of herbage and grass to graze and seek protection from punishing weather and predators, the cavies also flourish in cropland, where they commonly feed on crops and graze with cattle in pastures.(11) (12)

Negligible data is available on the distribution or population status of capybaras in Florida. Currently the partially web toed mammal is categorized as an "observed species" by the Florida Fish and Wildlife Conservation Committee (FWC) because no confirmed breeding numbers have been definitively substantiated.

The total number of non-captive capybaras (meaning those neither kept as pets nor in a zoo) in Florida is unknown.

There is however consensus that stable numbers exist in north-central Florida abutting the Santa Fe River from where sightings have been reported ever since the days of the runaway capybaras in 1994.

That there is a breeding population, is undeniable, because feral capybaras average in longevity between six to eight years. It is inconceivable that the original individuals , which escaped the Gainesville conservancy in 1994, would continue to be alive and periodically visible till date. The sighting of pups, juveniles and sub adults irrefutably points to the capybaras multiplying and increasing in numbers.

Between 2001-2015, a herd of the cavies were regularly observed foraging around Alligator Lake, Lake City, Florida, affirming long-term survival of capybaras in Florida.

Capybaras have large, cylindrical bodies, bulging out in the middle, covered with thin and rough, red-brown to dark-reddish hair, turning a yellowish brown on the belly and sometimes black on the face. On account of the skimpiness of their coats, capybara skin is easily visible beneath the keratinous cover.

The vestigial tails and partially webbed feet of the murine, make them agile swimmers, both over and underwater. Their forelegs are nominally shorter than their hind legs; they have four toes on their front feet and three on their rear feet. The nostrils, eyes and ears of the shy creature are positioned high on the head, so they can see and hear easily while swimming and paddling - making them well adapted to a semi aquatic lifestyle, swimming submerged for considerable distance.(5)

Capybaras employ a medley of vocalizations, consisting of grunts, clicks and squeaks- but pivotal communication is by scent-through a pronounced gland on the snout–analogous to a dark, large protuberance in male of the species. Nasal scent glands in females are modest in comparison. Capybara researchers and viewers distinguish between the sexes from the size of the scent glands, called "morillos" visible on the snouts.

They also possess anal scent glands, which along with "morillos",are markers for territorial, sexual and foraging dominance, threat from predators, physical aggression and indicators of collective and individual identity.(13)(14)

When the first Jesuits reached Brazil in 1549, travelling to Peru in 1568 Mexico four years later, they were startled to discover, not beef as back home in Europe, but carpincho meat was the staple protein of the indigenous population. During Lent, he clergy were faced with a piquant situation, having to explain to both the laity and the new converts that carpincho meat was inadmissible. It was against the forty days Lenten observance of abstinence.

According to folklore, the Jesuit Father General sought clarification from the Vatican on the atypical quadruped, unknown to Europeans, resistant to classification - which routinely lived in water, possessed webbed feet and emanated a fishy effluvium. He prayed that the peculiar creature to be declared a fish, since the newly baptised locals relished the aquatic delicacy - and fish was permissible during Lent.

Response from the Vatican was in the affirmative - The curious, web-footed denizen of the water, which tasted like fish, was undeniably a fish and indeed to be classified as one. Since that momentous day, capybara has been considered as a fish and commonly eaten during Lent in central and southern Venezuela - its dried and salted meat is a traditional Lenten dish with a volume in excess of 400 tons being sold during Easter.(15) (16) (17)

Capybara meat is white, possessing properties and qualities (such as high emulsification) that might comparable with pork and flesh from other animals in the meat industry. Hardened or cured Spanish -style sausages, such as Chorizo, Fuet and Secallona have been made of coarsely diced capybara meat. The flesh of the murine has also been found to be suitable in making german smoked chops and Italian mortadellas and frankfurters. Compared to 20% or more fat in beef, capybara flesh has just 1.5%, making preparations eminently suitable for cooking in a wide variety of ways, such as broiling, baking, sauteeing, grilling, wok-tossing, braising, breading and frying.(2)

Before large scale commercial livestock farming was introduced in South America, the capybara roamed freely across swamps and riverine landscapes throughout South and Central America. Presently, it is extant in the flooded grasslands from Panama to Paraguay, in the watersheds of the Orinoco, Amazon, Paraguay, and Parana rivers. High population densities are observed in the Pantanal of western Brazil and on the Llanos floodplains of Venezuela and Colombia.

Efforts to establish domestication of the capybara, also known as the water hog, have been actively undertaken in Brazil, Colombia, and Venezuela. However, it is in Venezuela, where licensed ranches harvest between 85,000-100,000 animals annually, does capybara raising take on a substantial and meaningful role.

The capybaras, renowned for their semi aquatic disposition, coexist with cattle, both in domesticated and wild states, without any competition for resources.

In a well-planned process, these capybaras are captured from free ranging herds during the dry season when their meat has a leaner profile than during other times of the year. Once secured, the carcass undergoes meticulous deboning, salting, and drying procedures, resulting in a meat of high gustatory value. Sustainable harvest rates of up to 40% can be achieved without causing detrimental population declines. From an economic standpoint, in capybara ranching, the net cash return per hectare stands at nearly 300% that of cattle.

When compared against sheep and rabbits, capybaras are cost efficient as they require less food per unit weight. However, the taste of capybara meat has higher oil content within the fat. Consequently, it has to be boiled thrice, to achieve adequate removal of oil and improvement of taste and nutritional quotients. With the fat and water being discarded, each time, a delectable, lean outcome is achieved. This stands in contrast to other rodent species where fat is considered highly desirable and nutritionally advantageous.

Capybara pelts, often referred to as “carpincho leather,” command handsome prices in discerning European markets. Hunters in Brazil, Uruguay, and Argentina primarily hunt capybaras for their prized skins, which have a unique unidirectional stretchability, perfect for crafting high-quality gloves.

Carpincho leather is renowned throughout Latin America and the world for its visual luxuriance, rich textural optic and unparalleled tactility. Although Argentina is the acknowledged global leader in leather from the “water Hog” (capybara), colloquially referred to as Orinoco, some remarkable examples of workmanship are seen in Brazil and Paraguay.

While the capybara is not endangered, hunting them in the wild is illegal in Argentina, which strictly regulates the harvesting and exporting of any carpincho product or derivative only permissible to harvest certified farm raised carpincho skin for making de-luxe , high-end belts, wallets, bags, jackets ,gloves and footwear.

The distinguishing feature of carpincho leather, which mimics soft-grained, brown-speckled suede, is the cluster of 5-6 bristle pores all over the surface, as opposed to the 3 follicles of peccary, javelina, warthog and pig leather. Leathers of all the five animals are comparable in physicality, strength, durability, tactility and manipulability, though Carpincho leather is marginally less fine than peccary. Ornate ankle length boots

with curved edge shafts, traditionally worn by Argentine cattle herders, called gauchos, are made of oiled, lightweight and resilient Carpincho suede or nappa.

Argentina is the only manufacturing exporter in the world of Capybara products. From no other country in the world are they legally crafted or exported. Carpincho leather has been valued for many years for being one of the finest leather in the world at par with reptile, ostrich and crocodile. It is sought after by connoisseurs of exotic skins, the world over for its exclusivity, authenticity and rarity.(18)(19)

In order to keep capybaras in captivity in Florida, a Class III wildlife permit is required. This is the lowest level of the Florida Fish and Wildlife Conservation Commission to categorize captive animals—many species in this category are common pets. For example, other Class III species include rats, parrots, guinea pigs, and foxes. It is possible that many sightings of capybaras throughout Florida are escaped or abandoned pets.

At their present distribution and population levels, over twenty-eight years (1994 -2022), the presently estimated number of fifty individuals, from the original eight escapees does not appear alarming. Therefore, the authorities have categorized the non-captive capybaras in the Florida "wilds" as an "observed species" – not as an invasive one – at par with the Nile monitor or cane toad. It is quite likely that many sightings of capybaras throughout Florida are of abandoned or escaped pets. Although there is no evident and visible detrimental effect or economic impact due to the presence of this non –native species in Florida, ongoing research focus is on their possible threat to human health, fecundity, breeding habits and potential for population expansion and establishment of addition herds.

Health authorities are cognizant of the dangers from capybara to public health. The murine are asymptomatic carriers, for pathogens for Rocky Mountain spotted fever (Brazilian Spotted Fever), Chagas disease and Surra that can infect humans, livestock and domestic animals.

Coupled with the possibility of serious health hazards, in their native range capybaras can negatively impact agriculture, damaging crops. At times of food deficiency, they have been observed eating soybeans, corn, and sugarcane. Also, due to their generalist herbivorous diet, it is not known if capybaras would feed on other crops found in Florida such as peanuts, strawberries, or other low-growing vegetables or fruit crops.(6)

In the distant future, should the innocuously introduced rodent become invasive, as has been the case with many other non –native creatures in Florida, with the present tanning infrastructure in the United States, luxurious capybara (carpincho) leathers for high–end accessories of beauty and quality can easily be made by reputed US tanneries. With the herds, possibly limited to Florida, the issues of traceability and sustainability could be effectively addressed, with Florida Fish and Wildlife Conservation Commission as the certifying authority.

With the strong trading links enjoyed by the United States for many years with Hispanophone countries in central and South America, a ready market can be tapped into for Capybara meat and derivatives, thereby sustainably utilizing the entire animal nose-to –tail.

Reference :

(1) https://bestleather.org/types-of-leather/carpincho/#:~:text=Carpincho%20refers%20to%20a%20large,used%20to%20make%20luxurious%20gloves.

(2) http://www.rebsig.com/capybara/

(3) https://en.wikipedia.org/wiki/Capybara

(4) https://en.wikipedia.org/wiki/Beaver

(5) https://edis.ifas.ufl.edu/pdf%5Carchived%5CUW%5CUW438%5CUW438-11726885.pdf

(6) https://storymaps.arcgis.com/stories/a029f491389241fd87ab7396862447e8

(7) https://www.latimes.com/local/la-xpm-2011-aug-18-la-me-0818-capybara-20110818-story.html

(8) https://www.iheart.com/content/2022-08-12-worlds-largest-rodent-found-wondering-in-missouri/

(9) https://www.kansascity.com/news/nation-world/national/article263838882.html

(10) https://www.researchgate.net/publication/345844506_Status_of_Capybaras_Hydrochoerus_hydrochaeris_Rodentia_Hydrochaeridae_and_Potential_for_Establishment_in_Florida

(11) https://abcnews.go.com/US/capybaras-giant-rodents-native-south-america-invasive-species/story?id=41617281

(12) https://www.nationalgeographic.com/animals/mammals/facts/cabybara-facts

(13) https://blog.nature.org/science/2020/02/11/capybara-meet-the-worlds-largest-rodent/#:~:text=Capybaras%20use%20a%20variety%20of,resembles%20a%20large%2C%20dark%20hump.

(14) https://www.jstor.org/stable/1382209

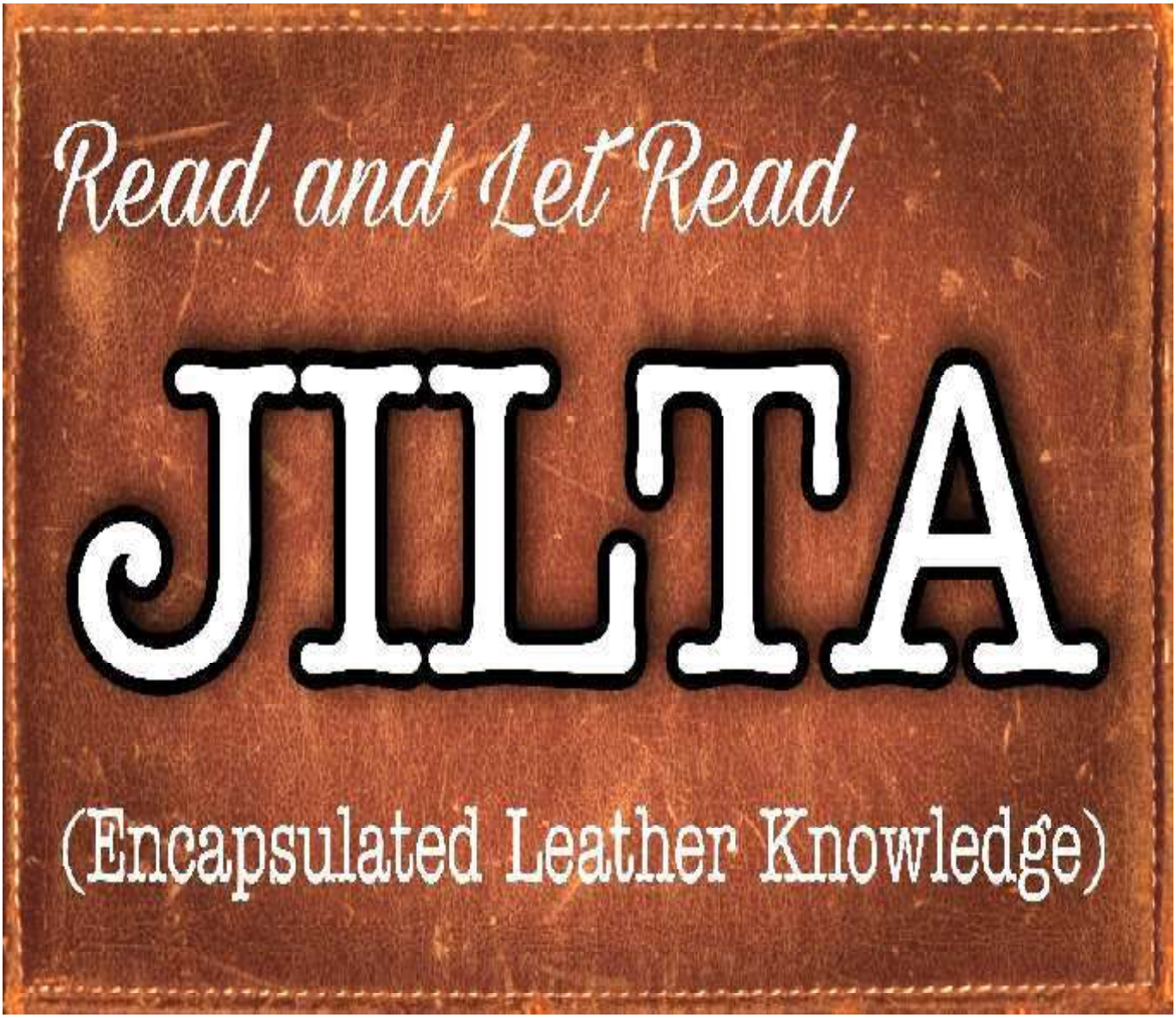
(15) https://blogs.scientificamerican.com/thoughtful-animal/once-upon-a-time-the-catholic-church-decided-that-beavers-were-fish/

(16) https://www.aggiecatholic.org/blog/2013/02/alligators-beavers-and-capybaras-are-fish

(17) https://www.atlasobscura.com/foods/capybara-venezuela

(18) https://www.piecesofargentina.com/sneak-peak-blog/2016/9/20/carpincho-aka-capybara-hide

(19) https://peccaryleather.com/blog/peccary-leather-vs-carpincho-leather-how-to-distinguish-them/



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SCIENCE & TECHNOLOGY

Pigments and their Excellence

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(Continued from the previous issue)

ORIGIN OF COLOUR

THE word colour bears some inherent and intimate relation with light on which the character of colour depends. Therefore the latter term should be discussed at the onset.

Light is a form of radiation which may be described as an electromagnetic wave motion propagated at a speed of 3×10^8 m/sec. in vacuum There are different types of electromagnetic radiation which differ from each other only in frequency, i.e., the number of times the electrical field strength reaches a maximum during a given time. Instead of frequency the difference may be expressed in the form of wave length λ. The speed of light is the multiple of these two characters.

$c = \lambda r$. c=speed of light in vacuum.

or, $r = \frac{c}{\lambda}$

Each type of electromagnetic radiation has a characteristic energy (E) which may be expressed by the formula—

$E = hr$ h is known as Plank's constant.

$= h.\frac{c}{\lambda}$

or, $E = k.\frac{1}{\lambda}$. or, $E \propto \frac{1}{\lambda}$.

This indicates that with the increase of λ (wave length), the energy content of electromagnetic radiation decreases. The wave length of these rays may vary from 10^4m. (Broad cast radio) to 10^{-7}Å (Cosmic rays). In between this large range, those having wavelengths from 4000Å – 7700Å (or 400mμ – 770mμ) is known as visible rays to the human eye. Therefore, according to the above formula, the energy of violet rays having wave lengths 400mμ is more than that of 770mμ (Red).

In a compound there is a specific arrangement of electrons in its atomic and molecular orbitals. Each orbital has its own electronic configuration and their individual energy levels are different. So, in a shell the 3p orbital electrons bear less energy than the 3d-orbitals of the same shell. In the case of colour bearing compounds, the difference of energy levels between the successive outer orbitals is less, i.e., the energy levels are very much close to each other. Or, in other words, the energy needed to take an electron to the next higher orbital is less.

If this type of compound is irradiated to such visible rays whose energy content corresponds exactly to the energy needed for an electron of that compound to reach next higher level, only then the compound will absorb that radiation. In case of coloured compounds the difference of energy levels of their outer orbitals fits with the energy

content of solar rays. So, when these are exposed to ordinary white light (bearing all the component colours of the spectrum) it will absorb that colour whose energy just fits with the energy requirement of electrons to reach next higher level, and the molecule will leave or reflect the other components of rays which is the colour of the compound to human eyes.

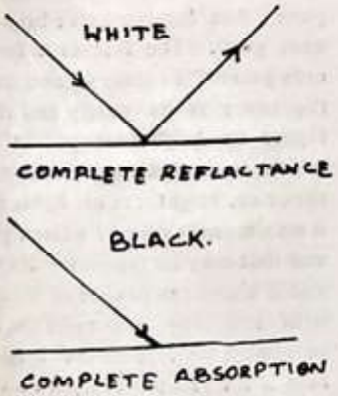
In this context it is worth mentioning that ordinary glass

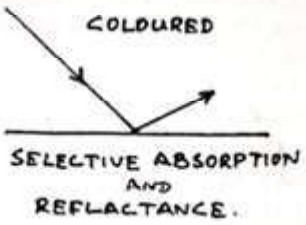
does not absorb any visible rays. Because here the difference of energy levels of outer electron orbitals is much more than the energy content of visible rays. So it remains colourless in white light. But it absorbs short wave or radiations of higher energy and is completely opaque to such short wave rays.

According to the above discussion, a substance is coloured when there is discrimination in absorption (reflection) of different rays present in visible spectrum, by the coloured surface. Therefore, colour in substances may be said to be due to selective absorption and reflection of certain components of white light which falls on them.

In the same way, a substance looks white only when there is no discrimination in absoption between the blue, green and red regions of the visible spectrum. But when the surface absorbs almost all the visible rays present in normal light the surface appears black.

The situation may be visualized in the following figures—





Chromaticity Diagram :

It was experimentally established by Grassman that any colour can be obtained by mixing three suitably chosen primaries. But the condition for such suitable spectral composition is that none of the primary stimuli colour can be obtained by a mixture of the other two. Three suitable primary colours may be red, green and blue.

According to Grassman's law, if S means the colour obtained by additive mixing, then

$$S = rR + gG + bB$$

where R., G & B are the three primary stimuli and r, g and b are the relative amounts needed for the match. Here, $r+g+b=1$, therefore it suffices if two of these parameters are known.

In order that all real colours shall be expressible in terms of positive values of the parameters in Grassman's equation it is necessary to carry out linear mathematical transformations. By doing this one comes away from the system having the primary stimuli R, G and B as co-ordinate axes to another system, the CIE system in which the co-ordinate axes are denoted by x, y and z. But here, it must be realised that x, y and z are virtual stimuli, i.e., they do not bear any real colour sensation but are methematical fictions. But even then it is very difficult to visualize the nature of the colour from the x, y and z values.

Hardy and others have shown that an indication of colour may be obtained by converting the x, y and z values to chromaticity co-ordinates, x, y and z and then plotting these to obtain the dominant wavelength of colour and its percent purity. The co-ordinates can be obtained by the following equations.

$$x = \frac{X}{X+Y+Z},$$

$$y = \frac{Y}{X+Y+Z},$$

$$z = \frac{Z}{X+Y+R}$$

So that $x+y+z=1$

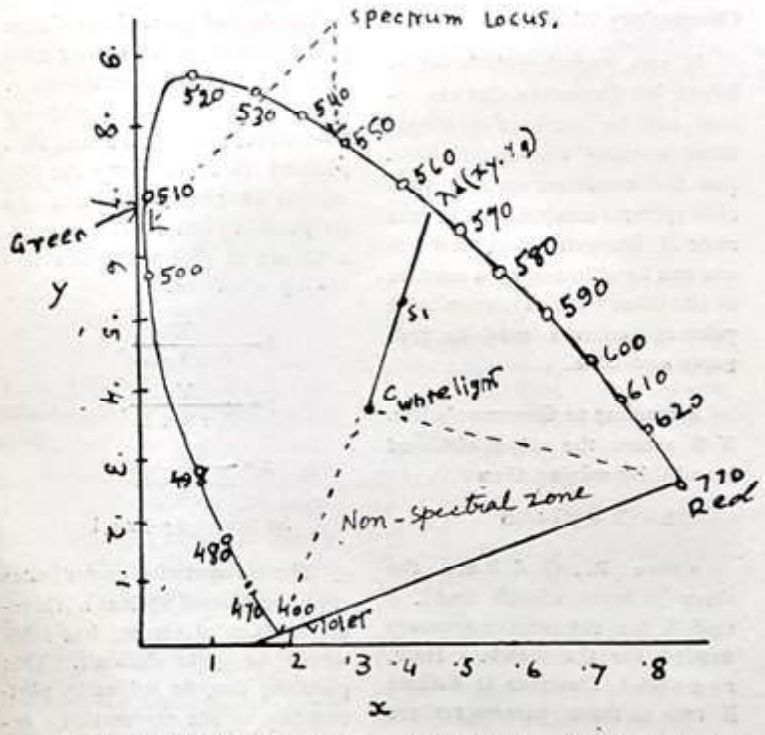
The chromaticity co-ordinates could be plotted against a three-dimensional diagram, but this would be quite difficult. This problem can be solved by plotting two of the chromaticity coefficients (usually x and y) on a special two-dimensional diagram from which the dominant wave length (λ d) of the colour and its present purity can be obtained.

Two dimensional diagram is sufficient as because by knowing two co-ordinates (x, y) the third one (z) can easily be obtained by subtracting the summation of the former co-ordinates from 1. What more things can be obtained is the measure of lightness

or relative brightness from the y value as because the three parameters x, y and z have been chosen in such a way that only Y is dependent on the luminous reflectance, ie., on what the eye appreciates as lightness or relative brightness.

violet corner and neutral illuminant (Point C) and the red corner, by joining the red and violet corners is known as the non-spectral zone.

Usually the statement of x and y values will only give a poor idea on the nature of colour



The chromaticity co-ordinates of the spectrum colours form a line which is straight in some places and curved in others, and which is known as the *spectrum locus*. The straight line between the red and violet corners represents the purple colours which do not occur in the solar spectrum, but which can be produced if mixtures are made of the red and the violet parts of the spectrum. This is why the triangle formed by joining the points

in question. Hence it has now become a practice to quote also the wavelength of monochromatic light corresponding to the hue, and the concepts of dominant wavelength and purity were introduced.

Suppose we have a colour having its location at S_1. The dominant wave length (λd) is the wave length at that point on the spectrum locus where it is cut by the extension of a straight line

from the light source co ordinates C through the point S_1. In the figure, λ d is approximately 565mm. So, if there be another point S_2 on the same line radiating from the point C, having the same dominant wave length (λd) represent the same hue as in both the cases the position of dominant wave length is same. But the joining line is somewhat curved. Therefore, dominant wave length concept is geometrical rather than an actual entity.

The source C may be considered as having a neutral colour, that is, having no hue and therefore it is taken as white light.

By means of purity is meant the ratio of distance CS_1 to the distance c λ d. It can be represented as percentage purity. The relationship $cs_1/\lambda dc$ is a quantitative measure. From the ratio $\frac{cs_1}{\lambda dc}$ it is quite obvious that the closer the point S_1 to the spectrum locus, the greater is its purity.

The colour which lie on the spectrum locus thus have max. purity but luminance or brightness y=0. The further in towards point C a colour is situated the lower is its purity and the higher its brightness y. It is known to us that the term luminance or, brightness or, lightness is maximum in case of white light and that may be taken as 100% and is minimum in case of black light and may be considered to be almost 0%. Because brightness is the amount of light reflec-

ted from the sample. So, the luminance of any colour may be expressed as a fraction of this scale. So, in the spectrum locus the neutral point C has a max. brightness.

So, from the above discussion it becomes vivid that the three attributes of colour (dominant wavelength, purity and brightness) provide a better description colour than the x, y, z values.

Colour of Inorganic Substances :

Many of the inorganic substances, available in the market, are known as inorganic pigments because they are in use of surface coating purposes. There are different types of such compounds, but those substances, recognized as pigments of inorganic nature, are mainly ionic in character. These are the metal compounds, most often the transition metal compounds. These are always complexed with some ligand, be it with the molecules of the solvent, or other dissolved molecules or with ions of opposite sign. Their colour is due to the ligands attached with central metal ions. But with regard to their colour, the electronic configuration of the metal itself is of some attribute. When all the shells of a metal ion is filled up, they are usually colourless. But the ions with an incomplete d-shell (in case of transition metal ions) or with an incomplete f-shell (in case of lanthanide and actinide ions) are coloured, but as already mentioned the character of colour is dependent on the nature of ligand attached with the central metal ion.

Apart from the above discussion, the main points like unfilled orbital and the nature of ligand, these give an insight to the colour of inorganic pigments and the causes of the above two points are mainly—

1) Charge transfer, and
2) d-d transition spectra.

Charge Transfer Spectra :

Apart from the d-d transi ion spectra, there are sometimes intense absorption bands due to complex ion formation. In this case the spectra have been assigned to charge transfer transitions. The transfer which is an excitation of electron of an atom to an orbital, centred largely on the other, can be in either direction, $M^{e-} - L$ or, $M - \overset{e-}{L}$, and is of lower energy depending upon the *oxidation reduction energy of the electron transfer process.* Thus a good reducing metal produces a low energy, strong absorption band with a good oxidizing ligand and *vice versa.*

This type of charge transfer spectra is very much useful of transition metal ions which change valence readily due to the unfilled d-shell or f-shell and their charge transfer spectrum is shifted into the visible region thus giving coloured compounds. The spectrum here is composed of spectrum of metal ion and that of non-metal ions. Because the energy difference in the ground state and the excited state of metal ion is much less electron transition may occur through the absorption of light in the visible region.

The energy is required to produce spectra of the coloured molecule by its oxidation-reduction system. In this system, the coloured molecule is responsible for its colour on the ligand mainly because even if the metal itself contains the filled $-s$ or $-p$ orbital, the colour produced is due to the transfer of electron from the ligand itself as the energy difference of excited state and ground state of the ligand is much less than the energy difference of excited state and ground state of the metal. So, in many cases of colour production the coloured material itself contains ligand groups like oxide, cyanide etc. which by the excitement of electron of their outer orbital and its transfer to the metal ion causes the colour formation and thus the charge transfer spectra is produced.

d—d Transition Spectra :

There are five d-orbitals in the M shell of transition metal ions. But the shapes of all these are not same and electron density in all these orbitals are not also same. The five orbitals are denoted as dxy, dyz, dzx, dx^2-y^2, dz. In an electrical field or in the field of polar molecules or in a legand field the d shell orbitals split in o two or three levels depending upon the nature of the ligand field and the number of d-electrons. All these splitted orbitals differ from each other by an amount of energy denoted $\triangle$. The level of energy difference is much less and in many cases it corresponds with that of visible light. So,

excitation of an electron from the lower to the higher d orbital corresponds to an energy approximately equal to that of a quantum of visible light. Thus transition metal complexes are generally coloured.

Intensity of Colour :

According to the Beer—Lambert's Law—in t e case of a solution which absorbs light the amount of absorption will depend on the concentration of the solution and the stratum thickness (the thickness or the path length which light traverses) of the solution. In terms of equation

$$\log \frac{I_0}{I} = \epsilon . c . l.$$

where I_0 is the incident intensity of light,

I is the emergent intensity of light,

c is the concentration of solute in moles/litre,

l is the thickness of solution through which the light passes,

and ϵ is the constant, known as molar extinction coefficient.

Sometimes $\log \frac{I_0}{I}$ is called the Optical Density.

The term ϵ, the molecular extinction co efficient is characteristic of the substance in solution causing absorption of light.

So, $D = \epsilon . c . l.$

If the stratum thickness be unity, i.e., for unit thickness of stratum layer, $D = \epsilon . c$. Therefore, optical density is the multiple of these two factors. For a coloured compound, optical density is constaht. Now, for a fixed value of optical density, it is the multiple of ϵ and c. If the value of ϵ is small, c is to be greater. In that case, the compound itself is less intense in colour, because ϵ determines the intensity of colour. $\epsilon > 10^3$, coloured substance can be used for surface coatings.

For the same reason, chrome alum and potassium permanganate differs in intensity of their individual colour.

Transformation of Pigment Property from Molecular Level to Bulk Level :

The colour of single pigment molecules is quite different from the pigment crystals built up from the assemblages of these single molecules by their crystallographic arrangements.

When a large pigment crystal is crushed and converted to small particles of different minute sizes the colour seen by the eye becomes lighter with the decrease of particle size due to the increasing proportion of scattering of light by the large number of air/particle interface. So with grinding and dispersion of pigment lumps their colour produced becomes lighter.

Pigment powders are normally dispersed in a medium of some kind and the refractive index difference between the pigment particle and the medium (generally around 1.5) will be less than the R. I. difference of pigment particle and air (1.0). So when the pigment particles are dispersed in a phase or applied to a substrate the lowering of the R.I. difference of pigment particle and medium makes its hiding power less. It is fact that in the bulk level the hiding power of pigment is less than in the ordinary stage (when there is only air/pigment boundary). This is why, chalk having a R.I. of 1.6 produces little covering up effect in linseed oil (1.5) and is not classed as a white pigment. But when the same is used for white wash purpose the scattering power of the dry white washed wall is high because in the dry condition it has only air/chalk interface and the R.I. difference is larger than in the previous case.

Again the condition of the substrate, its smoothness, absorbency, etc. plays their roles and these are to be encountered in the bulk phase where pigment is applied in the season form.

Hiding Power :

The hiding power of a pigmented film is the measure of its ability to hide or obliterate the colour or pattern of the substrate on which it is applied. It is an optical phenomenon related to the ways in which the incident light is reflected, refracted and absorbed by the film. A part of the incident light is reflected at the air/film boundary and the greater this portion hig-

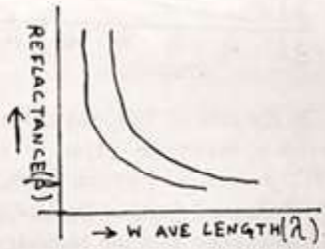
her is the gloss. Of the fraction of the incident light which penetrates the film, some part will, after scattering and reflection by the pigment particles, again leave the film. Another part of the penetrating light will be absorbed, mainly by the pigment. The rest may reach the surface of the substrate where some of it will be reflected. These reflected rays are again subject to reflection, scattering and absorption in the film, but some of them may reach the film/air surface and re-emerge. Hence of the light which is reflected by the whole system a fraction may consist of rays which have reached the substrate.

The total intensity of incident light, therefore, interacts with the scattering power of pigment surfaces, denoted by a constant known as scattering co-efficient ($S\lambda$) and absorption power of individual pigment particles, known as absorption co-efficient ($K\lambda$). Strictly speaking, both these two constants vary with the wave lenght (λ) of the incident light. These two constants are inter-related by a formula known as Kubleka-Munk equation,

$$\frac{K\lambda}{S\lambda} = \frac{(1-\beta)^2}{2\beta}$$

where β = reflectance of a sufficiently thick pigmented surface.

The greater advantage of Kubelka-Munk equation is that it gives a method for accurate determination of hiding power and is of greatest importance today. As the value of both scattering co-efficient and absorption co-efficient is dependent on the wave length of incident light, the reflectance of the pigmented film is also dependent on the wave length of incident light. Again, higher reflectance indicates greater scattering from the pigmented surface. So scattering determines the % of reflectance, as is evident from the following figure.



The scattering and absorption of incident light depends on (1) the relation between the R.I. of the pigment and binder and (2) the extent and nature of the boundary surface between the two phases, pigment and binder, i.e., such factors as particle size and size distribution, particle shape and degree of dispersion in the binder.

The hiding power is dependent on the R.I. difference between pigment and that of binder $n_p - n_b$.

n_p = R.I. of pigment particle.

n_b = R.I. of the vehicle, i.e., binder.

The greater the difference the greater will be scattering or reflectance and hence the hiding power. Again R.I. itself is dependent on the wave length (λ) of incident light. Therefore the scattering will also be high as is evident from the above figure and the following table.

The hiding power is also dependent on the nature of the boundary surface between pigment and binder and in particular on its extent. This implies that it is dependent on particle size, and distribution and on the quantity of pigment etc.

Hiding power increases with diminishing particle size down to a certain extent, since the number of reflective surfaces incre-

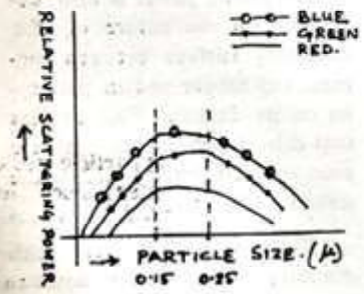
Pigment	Av.P size (μm)	Scattering Co-efficient Blue (λ = 4500Å)	Green (λ = 5600Å)	Red (λ = 5900Å)
TiO_2, rutile	.23	.4814	.4504	.4349
TiO_2, anatase	.24	.4246	.3921	.3874
ZnO	.51	.2447	.2168	.2141
BCWL	1.02	.2570	.2279	.2252
$BaSO_4$	2.16	.0625	.0648	.0654
$CaCO_3$	1.65	.0467	.0485	.0485

ases with diminising particle size. As the size of the particles approaches the wave length of light, their ability to return light towards its source and thus to hide the substrate, increases. Further reduction of particle size results in a steady decrease in the hiding power. There is a definite relationship of particle size with the scattering power which can be formulated by—

$$\alpha = \frac{2\pi n_s r}{\lambda}.$$

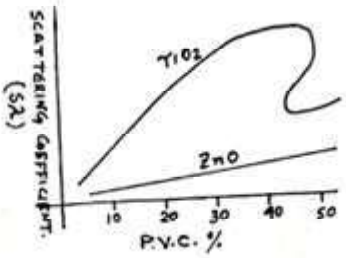
where α = scattering power.

The equation indicates that the scattering power is dependent on the wave length of incident ray.



The graph also gives the feature that with increasing wave length, i.e., with decreasing energy content of incident light the scattering power decreases and though in the equation the scattering power is directly related to the particle size but the graph explains the actual phenomena, ie., scattering power increases with the gradual increase of particle size but up to a certain extent beyond which the scattering power decreases even with the increase of particle size. So the region attained in the graph denotes the optimum particle size.

The hiding power of a pigmented film will increase with its pigment content because the higher pigment content will produce large number of scattering sites at the surface.



In the case of TiO_2 the curve passes a maximum value at a PVC somewhat above 20%. The downward trend of the curve at higher concentration indicates that the extra pigment surface remain unutilised for scattering of light at higher pigment concentration.

Tinting Strength :

Tinting strength (usually known for a coloured pigment) or tinctorial strength (referred for white pigment) of a pigment is a measure of its hiding power of the colour of a substrate. This is done by applying the paint to a substrate consisting of light and dark bands. When the film is dry it is inspected to see if it is uniformly light or if light and dark fields can still be distinguished. It is best represented by the contrast ratio :

Rb/Rw where Rb = Light reflection from the film over the black area,

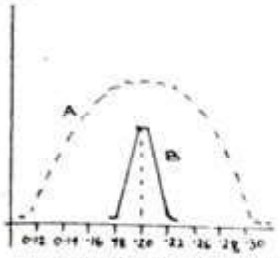
Rw = Light reflection from the film over the white area.

It has been found that no difference can be detected by human eyes when the contrast ratio Rb/Rw $\geq$ 0.98.

Gloss : Gloss is also another parameter which helps to increase the hiding power of a pigmented film. A part of the incident light is reflected at the air/film boundary and the intensity of reflected light depends upon the gloss of the surface. The higher the gloss, the greater this fraction of reflection is. As a result, the intensity of incident light which penetrates the film and is scattered by the pigment/film boundary decreases. But for maintaining the gloss, smoothness of the surface is a most vital point and the transparency of the top coat is an essential factor, because transparency gives a mirror reflection of surrounding objects. These last two factors help to provide specular reflection of reflected rays.

Purity : As already mentioned the hiding power depends on the distribution of particle size also in the film, because in fact we never can achieve a uniform particle size. But if the size of the particles are widely distributed in medium then the film produced will be of low hiding power. Because the nature of distribution of particle size determines the uniformity of scattering on which the purity or luminosity of colour depends.

(See the figure on next page)



DISTRIBUTION OF PARTICLE SIZE

From the figure it is evident that the average particle size is same in both the cases but from the curve B it is evident that particles are very narrowly distributed, i.e., the difference of particle sizes is much less than the curve A where the particle size difference is much greater. So the hiding power characteristic of the pigmented film is greater in the case of system having the particle size characteristics like curve B and the luminosity of colour is also greater in this case.

A) Iron Oxide Pigments :

This group of pigments is important because it covers a wide range of hues and all the pigments are stable to light and other climatic conditions. They may be sharply divided into natural and synthetic types.

The naturally occurring iron oxides include Haematite (Fe_2O_3) which is red in colour and Magnetite (Fe_3O_4) which is black, apart from Limonite [FeO (OH)] which is yellow. The synthetic iron oxide class is modern and are based on iron containing by-products from a variety of industrial processes such as sulfuric acid production. Synthetic iron oxide pigments are obtained as ferrous sulfate and purified by recrystallization. There are two main methods of manufacture from crystalline ferrous sulfate [$FeSO_4 . 7H_2O$] also known as green vitriol.

a) By calcining the green vitriol, which passes through a number of stages of dehydration and dissociation is finally converted to ferric oxide.

$$2(FeSO_4 . 7H_2O) \xrightarrow{\Delta} Fe_2O_3 + SO_3 + SO_2 + 14H_2O.$$

By careful control of the temp, feed rate etc. a variety of grades from light to dark reds may be obtained. The lighter ones are Turkey reds and darker Indian reds.

b) Calcining a mixture of green vitriol and lime leads to a pigment containing a mixture of Fe_2O_3 and $CaSO_4$ which is known as Venetian red. The initial mixture and the conditions of heating are adjusted to give a pigment with 40-45% Fe_2O_3 content. Cheaper grades are made by adding more calcium sulfate.

By precipitation of the pigment under special conditions from an aqueous solution of green vitriol, it is now possible to obtain three iron oxides of different hues.

i) α-FeO (OH) which is yellow. On heating over 200°C it forms $\alpha-Fe_2O_3$.

ii) γ-FeO (OH) which is orange. On heating to just below 350°C, it dehydrates to form $\gamma-Fe_2O_3$, which is ferromagnetic and brown in colour.

iii) Fe_3O_4 or magnetite which is black. It may be converted at high temperature in oxygen rich atmosphere into $\alpha-Fe_2O_3$.

Fe_3O_4 is now-a-days prepared by precipitation of $Fe(OH)_2$ from an aqueous solution of a iron (II) salt at the same time as a stream of hot air is blown into the reaction mixture.

$$6Fe(OH)_2 + O_2 \longrightarrow 2Fe_3O_4 + 6H_2O.$$

Iron oxide pigments have excellent hiding power. They are permanent to light in both mass tone and in tints, are non bleeding in all binders and solvents and are resistant to alkalis and mild acids. They serve to protect, to a high degree, the binders in which they are dispersed since they are strong absorbers of UV light. They are thus suitable for all types of outdoor applications.

B. Titanium Dioxide Pigments :

The high refractive index of titanium dioxide in rutile form gives higher scattering power and, therefore, better covering power.

Manufacture—There are two processes for the manufacture of titanium dioxide from its chief ore Ilmenite. The old process

is sulfate process and the new one is chloride process.

i) *Sulfate Process*—In this process the Ilmenite ore ($FeO-TiO_2$) is pulverized and mixed with strong conc. sulfuric acid. The iron present in the ore (ilmenite) is subjected to oxidize to the ferric (III) form because sulfuric acid acts as an oxidizing agent.

$$FeO, TiO_2 + H_2SO_4 \longrightarrow TiOSO_4 + FeSO_4 + H_2O.$$

$$2FeSO_4 + H_2SO_4 \longrightarrow Fe_2(SO_4)_3 + H_2.$$

To make the ore pure and separated from its impurity, the ferric state of iron is to be reduced to ferrous state and this is done by adding iron filings to the whole mass. The colour of the solution changes from brown to black during this reduction process. The solution is cooled to crystallize the ferrous sulfate and centrifuged to remove most of the crystals.

$$2\,Fe^{+++} + Fe \longrightarrow 3Fe^{++}.$$

After settling the crystalized mass the clear liquor is decanted off and heated with water at its boiling point. The titanium oxosulfate begins to be hydrolyzed and the colour of the solution. is changed from black to a final white slurry as the raw pigment particles develop.

$$TiOSO_4 + (n-1)H_2O \longrightarrow TiO_2, nH_2O + H_2SO_4.$$

The insoluble hydrated titanium dioxide, known as titanic acid which is formed is filtered off, washed and the paste is calcined in a horizontal oven when water, along with sulfuric acid, if any, is driven off and the pigment in the form of crystalline oxide is produced.

$$TiO_2, nH_2O \xrightarrow{800-1000C} \rightarrow$$

$$TiO_2 + nH_2O.$$

By this process, anatase type of pigment is mostly produced. To manufacture rutile form, a small amount of finely divided rutile "seed" is added to the amorphous titanic acid paste and then calcined under a particular temperature. The addition of rutile "seed" converts anatase to rutile form during calcination.

Chloride Process :

In this process, ore Ilmenite is reacted with chlorine under suitable conditions to produce titanium tetra chloride.

$$TiO_2 - FeO + C + Cl_2 \longrightarrow TiCl_4 + FeCl_3 + HCl + CO_2.$$

But the boiling point of $TiCl_4$ and $FeCl_3$ is not same. Ferric chloride has a lower boiling point than titanium tetrachloride. Therefore they can be separated from each other by means of distillation. Then titanium tetrachloride is treated with oxygeu at a temperature of 1000°C to produce solid titanium di-oxide and gaseous chlorine. This process yields pigment of high chemical purity and uniform quality and produces the rutile form of titanium dioxide. The reaction of titanium tetrachloride with oxygen can be represented as follows—

$$TiCl_4 + O_2 \xrightarrow{1000°C} TiO_2 + 2Cl_2$$

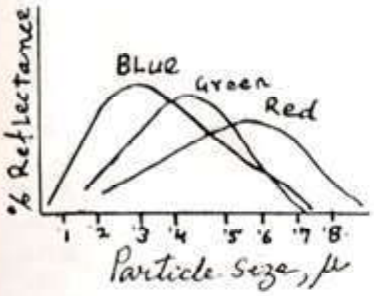
Regarding the application of pigment for finishing purposes, the effect of Pigment Volume Concentration is to be taken into account with particle size.

With decreasing particle size the PVC in the season should also be less for greater scattering power of the pigmented film. Because with increasing PVC and reduced particle size the interference in the speed of light will be less. So, the power of scattering of the pigmented surface will be less. This is why indiscriminate lowering of particle size will reduce hiding power. If the particle size is uniform the velocity of light will be accelerated through the medium. Both the scattering co-efficient and hiding power will be effective for low particle size and for low PVC.

The reflectance of primary colours is not same and it depends upon both the energy of the ray as well as the particle size of the pigment. It is known to us that blue having higher energy reflects more and red light reflects less but these are again dependant on the particle size of the pigment.

It is seen that blue light reflects more in the low particle size and red light reflects much in the big particle size. So, TiO_2

pigment having a particle size of round about .2μ seems to be blue and those having particle size of more or less .6μ will produce a yellowish colour.



The mean particle size of both the anatase and rutile form of titanium dioxide is .3μm and .4μm respectively. So, it is to be expected that pure rutile will always be slightly yellow than anatase.

It was already mentioned that anatase form of titanium dioxide contains a loose packing of its atoms due to greater distance of Ti–O bond and this leads to a susceptibility of the anatase form to the chalking tendency.

A number of investigations have led to the conclusion that the chalking of titanium oxide-containing paints is a photochemical process involving the absorption of ultra violet light. The absorption of a quantum of ultraviolet light releases the oxygen ions of TiO_2 in the surface of the pigment crystal as oxygen atoms according to the following equation.

1) $O^{2-} + h\nu \longrightarrow O + 2e^-$

The freed nascent oxygen atom reacts with the binder because of its high reactivity and oxidize the same.

2) Binder + O $\longrightarrow$ Oxidized binder.

As a result of which pigment particles lose their protective coat of binder and lie free on the surface as a chalky layer because they become deformed.

The electrons produced in reaction 1) reduce tetravalent titanium to trivalent titanium.

3) $Ti^{4+} + e^- \longrightarrow Ti^{3+}$

Trivalent titanium is again oxidized to tetravalent titanium by atmospheric oxygen.

4) $2Ti^{3+} + \frac{1}{2}O_2 \longrightarrow ?Ti^{4+} + O^{2-}$.

The primary photochemical reaction 1) occurs more readily in the case of anatase, on account of greater bond distance between titanium and oxygen due to which oxygen is always susceptible to attack by higher energy.

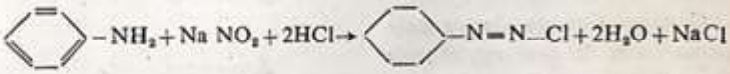
To reduce the chalking tendency of both types of pigment, surface treatments with such materials as Al_2O_3, SiO_2, ZnO & Sb_2O_3 are used. Each titanium oxide particle is thus surrounded by a thin film of the additive, which is beleived to reduce the susceptibility of oxygen ion in titanium dioxide to higher energy system and by hindering the atoms of oxygen formed in reaction 1) from immediately attacking the binder on the other. The oxygen atoms during their passage through the surface film react with each other to produce molecular oxygen.

$$O + O \rightarrow O_2.$$

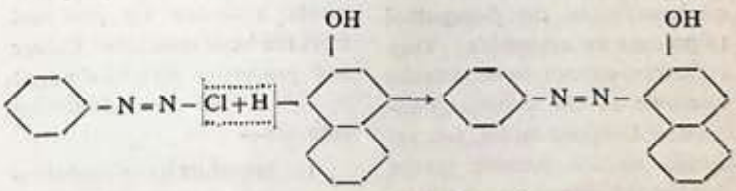
C. Azo Pigment :

The typical azo pigment is composed of two or more aromatic nuclei inter connected by azo groups (–N=N–). A monoazo pigment contains one such group and a diazo pigment contains two. The azo group in the colour producing part of the principal molecule, i.e., the chromophose, but other selected groups, called auxochromes also contribute to colour.

Azos are formed by diazotizing a primary aromatic amine and then coupling this to β-Naphthol. In the first reaction a diazonium salt is formed in an acid medium.



A solution of β-Naphthol is added to this mixture to produce coupling.



β–Naphthol Azo colour

Coupling products that are insoluble in this reaction medium and precipitate immediately on formation are called *azo pigments*. These products contain no salt-forming substituent, e.g., Carboxyl (–COOH) or Sulfonic (–SO H), in their molecular structure and are therefore strongly hydrophobic materials that tend to be soluble in organic media. The absence of salt forming groups makes them relatively unreactive with weak mineral acids and bases. They are also known as *Insoluble Azos*.

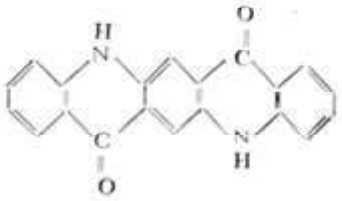
Coupling of components one or more salt forming groups, especially sulfonic acid, results in products having at least partial solubility in the reaction medium. These require further treatment to render them insoluble and therefore pigmentary. This may be accomplished by (a) conver ion into a metallic salt (Na, Ba, Ca, St, Mn), (b) formation of a metal chelate, (c) lacking on a highly adsorptive inorganic substrate, often in combination with a metallic salt. Those are called *Metallized Azos*.

Condensation azos derive their name from the necessity of their formation by the condensation method involving diazotization of the primary amine prior to condensation of the β-Naphthol to produce an arylamide. They are large enough to be virtually insoluble in the commonly encountered organic media, and yet contain no salt forming groups that would introduce sensitivity to chemicals.

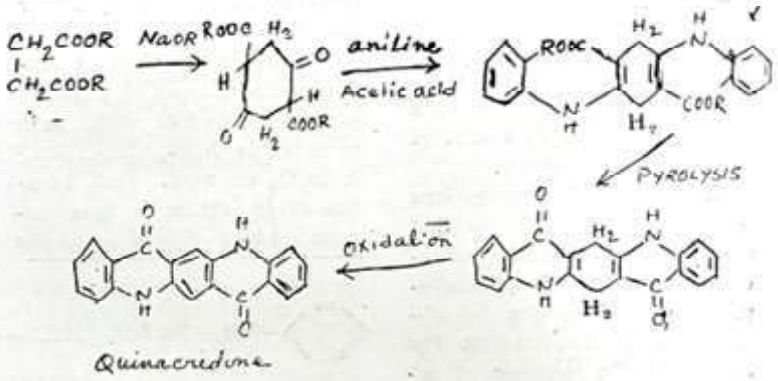
The tendency for azo pigments to be soluble in organic media leads to bleeding problems, and the lack of salt forming groups in their structure results in giving them good resistance to attack by chemicals. *The considerable increase in molecular size of diazo dyes gives them better bleed and chemical resistance as well as heat stability than most mono azos.* The presence of the second azo chromophore in the diazo also results in increased colour strength. Common examples are Toluidine Reds, Hansa Yellow, Dinotroaniline orange.

d) Quinacridone Pigments :

Quinacridone pigments are based on a chemical structure known generally as Linear Trans Quinacridone.



A typical synthesis (shown schematically below) consists of condensing two molecules of diethyl succinate in the presence of sodium alcoholate to form the sodium salt of succinyl succinic ester. The latter in presence of acetic acid catalyst, is then condensed with two molecules of aniline to the dianilino—tetraphthalic acid ester, and pyrdysed to dihydro quinacridone, which in turn is oxidised to quinacridone.



The various commercial pigments available are produced from the basic structure. Colour and properties may be changed by one or more of the following methods—

1. Introduction of substituents on the ring structure.
2. Change of the crystal phase.
3. Formation of solid solutions with quinacridone quinones.

The linear trans quinacridones are high melting solids, insoluble in common solvents. Consequ-

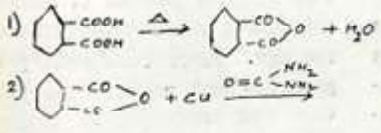
ently as pigments they are non-bleeding and quite heat resistant, besides being both alkali and acid resistant and quite lightfast.

Because of their overall excellence, they are widely used in high quality finishes. They are formulated primarily in blends with other pigments to give polychromatic automotive finishes and unusual styling effects. Common examples are Quinacridone, Gold, Scarlet, Orange and Magneta.

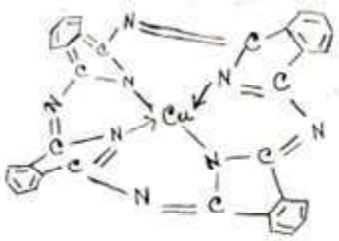
e) **Phthalo Cyanine Pigments :**

Phthalocyanines are a group of blue and green pigments having brightness of shade, tinctroial strength, ease of dispersion and very good hiding power. They have excellent light fastness and chemical resistance and do not bleed in oils or solvents.

Phthalocyanine molecules consist of four pyrrole nuclei fused with four benzene nuclei and linked by four nitrogen atoms. In the centre is a chelated copper atom. *Phthalocyanine blue* may be manufactured by reacting phthalic anhydride or phthalimide with a copper salt in the presence of urea or by reacting phthalonitrile with a copper salt with or without ammonia.



The initial product of the synthesis is almost worthless as a pigment, being hard, gritty and of low tinting strength. It has presumably not the correct crystal structure. The crude product is dissolved in conc. Sulfuric acid and the solution is immersed in



Copper Phthalo Cyanine

a large volume of water. This precipitates the pigment in an amorpheus form, which may then be converted into a product having the desired crystal form and particle size range.

Inspite of its pure hue and excellent light resistance Phthalocyanine blue has two defects. The first is related to its tendency to flocculate, because of its intrinsic non-polar nature, in polar vehicles like NC lacquer with resultant decrease in tinting strength. This is overcome by laking or by preparing the pigment in the presence of an inert base. Secondly the reddish nuance of α-form, in presence of aromatic solvents is converted into greenish nuance of the β-form, with increase in crystal size and marked reduction in tinting strength. This is corrected by introducing one chlorine atom/benzene group into the molecule.

Phthacyanine green may be prepared by the chlorination of copper phthalocyanine blue. At least 12 of the available 16 hydrogens on the benzene nuclei must be replaced with chlorine before a definite change from blue to green occurs. Direct chlorination requires relatively high temperatures and anhydrous conditions. The resulting crude product does not have good pigment properties ; it is therefore acid pasted with conc. H_2SO_4. The final green pigment does not crystalize in the presence of organic solvents and it is relatively free from flocculation in polar vehicles.

The pigment is very dark in mass tone and is rarely used as such. It has high tinting strength and it produces very brilliant medium and light tints with white or bright yellows which are very light fast. It has also good exterior durability and may be used in bright green automotive or metallized finishes.

It is also possible to obtain a metal free phthalocyanine which is much greener in hue than the copper compound. It also tends to crystallize in strong solvents and a modified form is necessary to give adequate stability in paint media.

Common ones are Phthalocyanine Blue BG, Blue B and Green G.

—Concluded.

INDIA'S MANUFACTURING ACTIVITIES FALL TO 5-MONTH LOW IN SEP

Manufacturing activities in India fell to a five-month low in September as new orders rose at a softer pace, which tempered production growth, a monthly survey said on Tuesday.

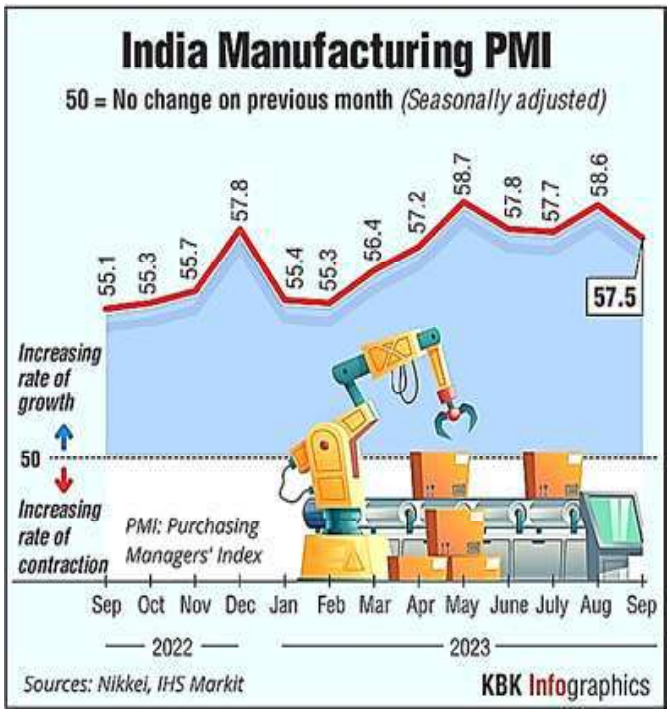
The seasonally adjusted S&P Global India Manufacturing Purchasing Managers' Index (PMI) fell to 57.5 in September, down from 58.6 in August — the lowest in five months. The September PMI data pointed to an improvement in overall operating conditions for the 27th straight month.

In PMI parlance, a print above 50 means expansion while a score below 50 indicates contraction. "India's manufacturing industry showed mild signs of a slowdown in September, primarily due to a softer increase in new orders which tempered production growth.

"Nevertheless, both demand and output saw significant upticks, and firms also noted gains in new business from clients across Asia, Europe, North America and the Middle East," said Pollyanna De Lima, Economics Associate Director at S&P Global Market Intelligence. On the inflation front, supply-chain conditions were broadly stable, which helped drag down the rate of input price inflation to its weakest in over three years, the survey said.

However, greater labour costs, upbeat business confidence and buoyant demand facilitated a sharper increase in output charges.

"... while robust demand was supportive of production growth, it added to price pressures in September. The solid increase in output charges signalled by the PMI data, which occurred in spite of a notable retreat in cost pressures, could restrict sales in the coming months," Lima said.



Meanwhile, the RBI Governor-headed six-member Monetary Policy Committee (MPC) is scheduled to meet for three days beginning October 4. RBI Governor Skhatikanta Das will announce the decision on Friday (October 6).

According to experts, the Reserve Bank of India may retain the benchmark rate at 6.5 per cent at the forthcoming bi-monthly monetary policy review. On the jobs front, the positive outlook for production and demand strength led to another round of job creation in the manufacturing industry.

Going ahead, Indian manufacturers were confident that output volumes would increase over the course of the coming 12 months, with the overall level of positive sentiment improving to its highest in 2023 so far on the back of buoyant customer appetite, advertising, and expanded capacities.

"Manufacturers held a strongly positive outlook for production, as they expect demand to strengthen over the course of the coming 12 months. "Upbeat forecasts continued to drive job creation efforts and initiatives to replenish input stocks," Lima said.

The S&P Global India Manufacturing PMI is compiled by S&P Global from responses to questionnaires sent to purchasing managers in a panel of around 400 manufacturers.

(PTI – 03/10/2023)

INDIAN ECONOMY TO GROW AT 6.3% IN FY 23 - 24: WORLD BANK

The Indian economy is projected to grow at 6.3 per cent in the current financial year, aided by investment and domestic demand. According to a World Bank report released on Tuesday, India continues to show resilience against the backdrop of a challenging global environment. In India, which accounts for the bulk of the South Asia region, growth is expected to remain robust at 6.3 per cent in 2023-24, the India Development Update of the World Bank said.On inflation, the report said, it is expected to decrease gradually as food prices normalise and government measures help increase the supply of key commodities.

The World Bank said South Asia is expected to grow at 5.8 per cent this year — higher than any other developing country region in the world, but slower than its pre-pandemic pace and not fast enough to meet its development goals.Relative to the spring forecast, growth in 2023 has been upgraded by 0.2 percentage points due to stronger-than-expected data in India.

"At first glance, South Asia is a bright spot in the global economy. The World Bank is forecasting that the region will grow more quickly than any other developing country region over the next few years," said Martin Raiser, vice-president, South Asia Region, World Bank.

Although India's post-pandemic economic rebound is now fading, growth is expected to remain stronger than in other large emerging market and developing economy (EMDEs). Output is forecast to grow 6.3 per cent in FY2023-24 and 6.4 per cent in FY2024-25 — roughly equal to the estimated pace of India's potential growth, the World Bank said. "The dampening effect of monetary policy tightening on domestic demand, particularly investment, will likely peak in the coming year. The effects of slowing global demand and rising interest rates will be mitigated by India's low external debt and the healthy balance sheets of its financial and corporate sectors," the bank said in its report. Growth of merchandise exports is expected to slow as a result of weak foreign demand growth, although this will be offset by robust services exports.

The World Bank said, in India, robust output growth in the first half of 2023 was supported by a strong expansion of investment and, on a sectoral level, continued strength of services. Government infrastructure projects have supported momentum in the construction sector, which has grown at year-over-year rates of around 10 per cent in recent quarters. "Export growth has benefited from strong exports of services, such as those related to information technology and consulting, which have been little affected by the slowdown in global growth. India's services Purchasing Managers Index (PMI) reached 62.3 in August, nearly 10 points above the global index," the bank said.

Employment indicators have been weaker, however, suggesting that with appropriate policies, the country's economic growth could deliver more robust job creation, it said. In India, inflation was trending below the upper bound of the inflation target range before a disruptive monsoon caused a substantial recent increase in food prices, the report noted. To counter this, the government has implemented an export ban on most types of rice. The Reserve Bank of India increased interest rates substantially last year, and has kept them steady since this February. According to the bank, in India, the financial sector has shown few signs of strain. Bank balance sheets and corporate leverage ratios have improved substantially in recent years.

The current account deficit has been predominantly financed by foreign portfolio investment and remittances. Foreign exchange reserves are at a healthy level, while the currency has alternated between periods of stability and mild depreciation. Non-performing loans in the banking sector are low.

(thehindubusinessline.com – 03/10/2023)

-: J I L T A : -

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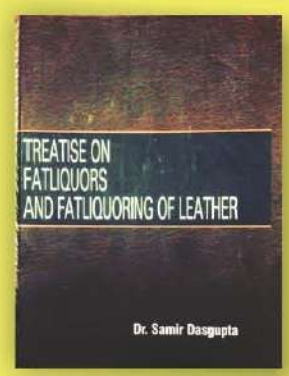

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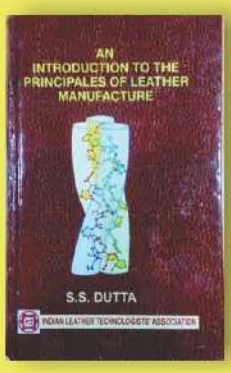

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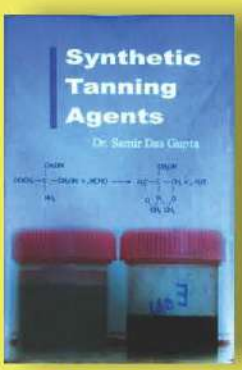

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ILTA
Since 1950

Indian Leather Technologists' Association

[A Member Society of International Union of Leather Technologists' and Chemists Societies]

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History and Activities of Indian Leather Technologists' Association

Registration No. KOL RMS/074/2022-24

The Indian Leather Technologists' Association (ILTA) was founded by Late Prof. B. M. Das, the originator of Das-Stiasnay theory and father of Indian Leather Science on 14 th August' 1950. The primary objectives of the oldest Leather Technologists' Association which celebrated its Diamond Jubilee year in the 2010, are:

- To bring all concerned with the broad spectrum of the leather industry under one umbrella.
- To organize seminar, symposium, workshop in order to create information, knowledge and latest development for the benefit of all concerned. To offer a common platform for all to interact with each other in order to understand each other's problems and prospects.
- To publish monthly journal as a supplement to those above objectives. The monthly journal of ILTA is known as journal of Indian Leather Technologists' Association and is the most widely circulated technical journal concerning leather technology.
- To publish text books for the benefit of students at various levels of study, for the researchers and industry.
- To have interface between urban and rural sector.
- To assist Planning Commission, various Government Institutions, Ministry and autonomous bodies to formulate appropriate policies acceptable and adoptable to the industry.
- To organize practical training and to provide skilled manpower and to motivate good students for study.
- To conduct activities related to the growth of the export of leather and leather goods from India.

ILTA also organizes Prof. B. M. Das Memorial Lecture every year during the Foundation Day Celebrations on 14 th August and Sanjoy Sen Memorial Lecture on 14 th January, the birthday of our late President for several decades. Many reputed scientists, industrialists and educationists have delivered these prestigious lectures. Foreign dignitaries during their visits to India have addressed the members of ILTA at various times.

ILTA have published the following books:

1. An Introduction to the Principles of Physical Testing of Leather by Prof. S.S. Dutta
2. Practical Aspects of Manufacture of Upper Leathers by J. M. Dey
3. An Introduction to the Principles of Leather Manufacture by Prof. S. S. Dutta
4. Analytical Chemistry of Leather Manufacture by P. K. Sarkar
5. Comprehensive Footwear Technology by Mr. Somnath Ganguly
6. Treatise on Fatliquors and Fatliquoring of Leather by Dr. Samir Dasgupta
7. Synthetic Tanning Agents by Dr. Samir Dasgupta
8. Hand Book of Tanning by Prof. B. M. Das

ILTA presents awards in the name of Prof. B. M. Das Memorial, Sanjoy Sen Memorial and J. M. Dey Memorial Medals to the top rankers at the University graduate and post graduate levels. J. Sinha Roy Memorial Award for the author of the best contribution for the entire year published in the monthly journal of the Indian Leather Technologists' Association (JILTA). From the year 2023 ILTA has started to present a Scholarship namely Prof. Moni Banerjee Memorial Scholarship to a Student of B. Tech / M. Tech Leather Technology who is meritorious but financially crippled.

ILTA is the Member Society of IULTCS (International Union of Leather Technologists' and Chemists Societies) which is a 125 years old organization. The International Congress of this union is held in different locations of the world once in two years. In its 125 years history, for the first time the Congress was held in January 1999 outside the developed countries and that too in India at CLRI, Chennai. Indian Leather Technologists Association organized the Congress under the able leadership and guidance of Late Sanjoy Sen, the then President of ILTA and IULTCS and Dr. T. Ramasami, the then Vice-President of ILTA and Director, CLRI, Chennai. In 2017 IULTCS Congress was successfully held again at Chennai, India for the second time.

In order to promote and provide marketing facilities, to keep pace with the latest design and technology, to have better interaction with the domestic buyers, ILTA has been organizing LEXPO fairs at Kolkata from 1977, Siliguri from 1992 and Durgapur from 2010. To help the tiny, cottage and small-scale sectors industries in marketing, LEXPO fairs give the exposure for their products. Apart from Kolkata & Siliguri and Durgapur, ILTA have held LEXPO at Bhubaneswar, Gangtok, Guwahati, Jamshedpur and Ranchi. In commensurate with the time, demand and new perspective of the modern leather users, ILTA has started to organize LEXPO at Kolkata from 2022 in a new shape with the Manufacturers and Exporters of Leather Goods from all over India.

ILTA has celebrated its Golden Jubilee with a year-long programme from 14 th August' 2000 to 13 th August' 2011 along with the first conference of South East Asian Countries at Netaji Indoor Stadium, Kolkata.

ILTA has also celebrated its Diamond Jubilee with a year long programme from 14 th August' 2010 to 13 th August' 2011 which included National Seminars, B. M. Das Memorial Lecture, Sanjoy Sen Memorial Lecture, Moni Banerjee Memorial Lecture, Y. Nayudamma Memorial Lecture and 3 day's AICLST (Asia International Conference on Leather Science and Technology) at Hotel 'The Stadle' at Salt Lake City, Kolkata.

The Association's present (as on 31.03.2023) strength of members is around 550 from all over India and abroad. Primarily the members are leather technologists passed out from Govt. College of Engineering and Leather Technology – Kolkata, Anna University – Chennai, Harcourt Butler Technological Institute – Kanpur, B. R. Ambedkar National Institute of Technology – Jalandhar and Scientists and Research Scholars from Central Leather Research Institute (CLRI).

In order to strengthen its activities, ILTA have constructed its own six storied building at 44, Shanti Pally, Kasba, Kolkata – 700107, West Bengal, India and have named it as "Sanjoy Bhavan".

This Association is managed by an Executive Committee duly elected by the members of the Association. It is absolutely a non-profit making voluntary organization working for the betterment of the Leather Industry. None of the Executive Committee members draws any remuneration for their services rendered but they get the satisfaction of being a part of this esteemed organization.

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